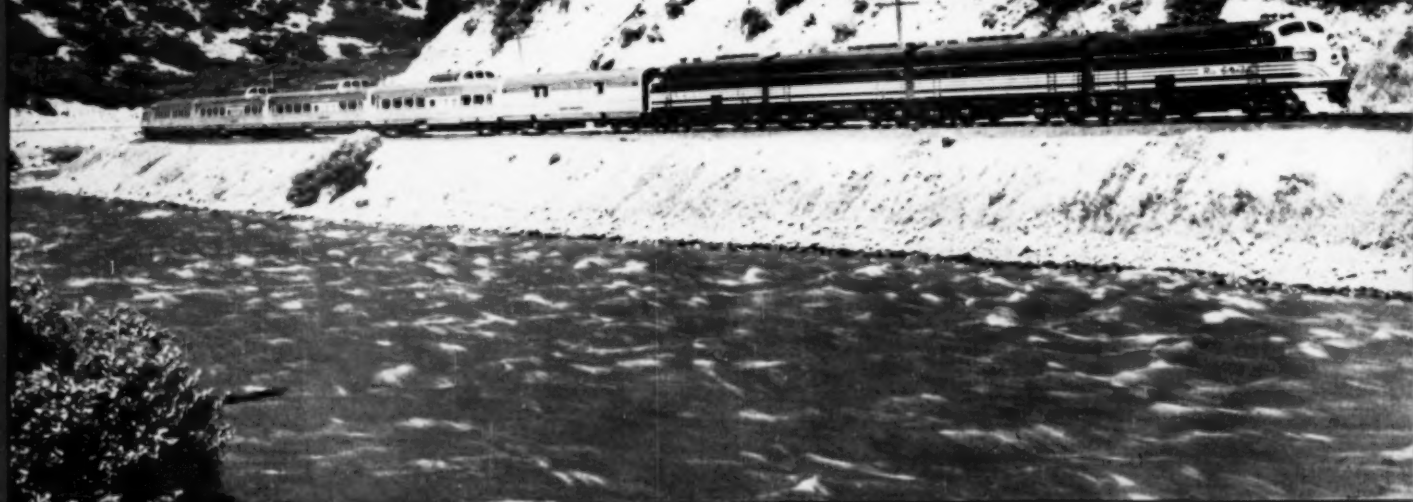


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# DIESEL PROGRESS



FIVE DOLLARS PER YEAR

JUNE, 1949

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One of five Worthington Diesels in the office building at 2 Park Avenue, New York. Engines generate all electricity used in the building, including that required to operate 28 elevators—a load that is constantly increasing. Four engines have been Texaco-lubricated for more than 11 years, and the fifth since its installation in 1946.

**"...minimum  
costs for  
maintenance"**

**That's just one  
of the benefits reported by this  
user of Texaco Ursa Oils**

Mr. Roy O. Wood, in charge of the Diesel installation illustrated, writes: "The [Texaco] oils have given outstanding results under all conditions. We find they have remarkable ability to keep our engines clean, free of carbon, sludge and varnish, thus assuring us efficient, trouble-free operation and minimum costs for maintenance."

Operators everywhere get these same results. *Texaco Ursa Oils* resist oxidation . . . stand up under high temperatures . . . keep Diesels clean, rings free, ports open. They assure better compression and combustion, so you get more power and use less fuel. Engine parts last longer. Maintenance costs stay low.

There is a complete line of *Texaco Ursa Oils*. They are approved by leading Diesel manufacturers and preferred by operators. In fact—*More stationary Diesel hp. in the U. S. is lubricated with Texaco Ursa Oils than with any other brand!*

Let a Texaco Lubrication Engineer help you increase your Diesel efficiency and economy. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



**TEXACO Ursa Oils**  
**FOR ALL DIESEL ENGINES**

Tune in . . . TEXACO STAR THEATRE every Wednesday night starring Milton Berle. See newspaper for time and station.



# Authorized Fuel Injection Service

*the Whole World Over*

Many years ago, American Bosch saw that one of the greatest contributions it could make to the progress of Diesel power was to establish a world-wide system of expert fuel injection service facilities. To achieve this, American Bosch pioneered an intensive program of factory training which still continues. As a result, Diesel users can buy American Bosch equipped engines with the confidence that factory-quality fuel injection service will always be readily available whenever needed.



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ment Co., 2348 East Eighth St.  
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ice Inc., 925 Girard St., N. E.

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*America's greatest name in fuel injection equipment*



# a Clean sweep

## for GM Diesel Power

PROBABLY the most unique vessel ever to ply the waters of New York harbor is the General Motors Diesel-powered "Driftmaster"—new U. S. Engineers Corps craft designed to pick up and dispose of dangerous floating debris in crowded New York harbor.

Propulsion power is supplied by two 6-cylinder, 2-cycle, non-reversing GM Model 6-268A Diesel engines. They are connected to 54" x 40" bronze propellers through 3 to 1 reduction gears, operated from the bridge by airflex clutches.

The "Driftmaster" is one more of the thousands of applications of GM Diesel power supplying low-cost dependable power and maximum maneuverability on rivers and harbors from coast to coast.



The "Driftmaster", built by Wills-Spedden Shipyard, Inc., Baltimore, Maryland for the Corps of Engineers is powered by two General Motors Model 6-268A Diesel engines.

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Leader in Diesel engineering development for 37 years

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**CLEVELAND DIESEL ENGINE DIVISION**  
CLEVELAND 11, OHIO  
**GENERAL MOTORS**



ENGINES FROM  
150 TO  
2000 H. P.



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## VALVES OPERATE IN ANY POSITION



The positive self-grinding, quick-closing DURABLA VALVE\* for Pumps, Diesel Engines, and Compressors is the only valve which operates with equal efficiency and adaptability in any position. Designers and users requiring valve replacement can fit it into those tight inaccessible places with complete confidence in continued efficiency, freedom from any need for more than very infrequent inspection, compact design, and light weight.

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\* Patent Numbers 2090486, 2117504



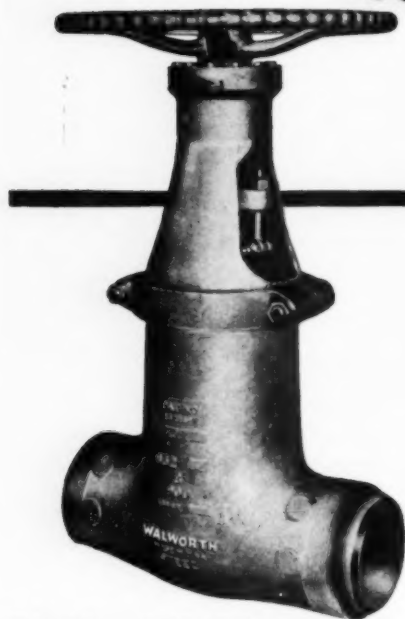
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**114 LIBERTY ST. NEW YORK**

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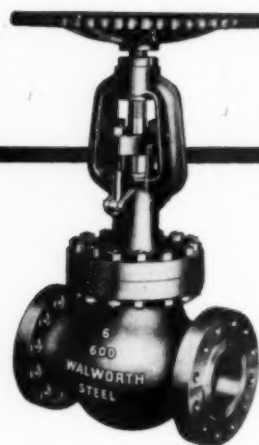


Walworth Series 150 Cast Steel Valves are tough and wear-resistant. Gate valves are available in sizes from 2" to 24", and globe valves in sizes 2" to 12".



Walworth Pressure-Seal Cast Steel Gate Valves exemplify the greatest improvement in high-pressure, high-temperature valve design. The internal pressure keeps the body-to-bonnet joint tight. Series 600: 1½" and larger — Series 900: 3" and larger — Series 1500: 1" and larger.

**Years of  
trouble-free service  
assured with . . .**



Walworth Series 600 Cast Steel Valves have strength and ability to resist wear. They assure long life and positive operation. Available in either gate or globe types — Gate: sizes 1½" to 18" — Globe: sizes 2" - 8".

## **WALWORTH cast steel valves**

Walworth Cast Steel Valves have proved their ability to assure years of trouble-free, dependable service. Accurately threaded stems, deep stuffing boxes, streamlined ports, and heavy cast alloy steel walls are their top features.

You can get full information about Walworth's complete line of steel, iron, and bronze valves and fittings from our new Catalog 47. See your nearest Walworth distributor, or write on business stationery for your free copy.

Walworth Cast Steel Fittings are manufactured in a wide range of types and sizes to meet every requirement. They are made to the highest standards of quality, both as to dimensional accuracy and metallurgical properties.

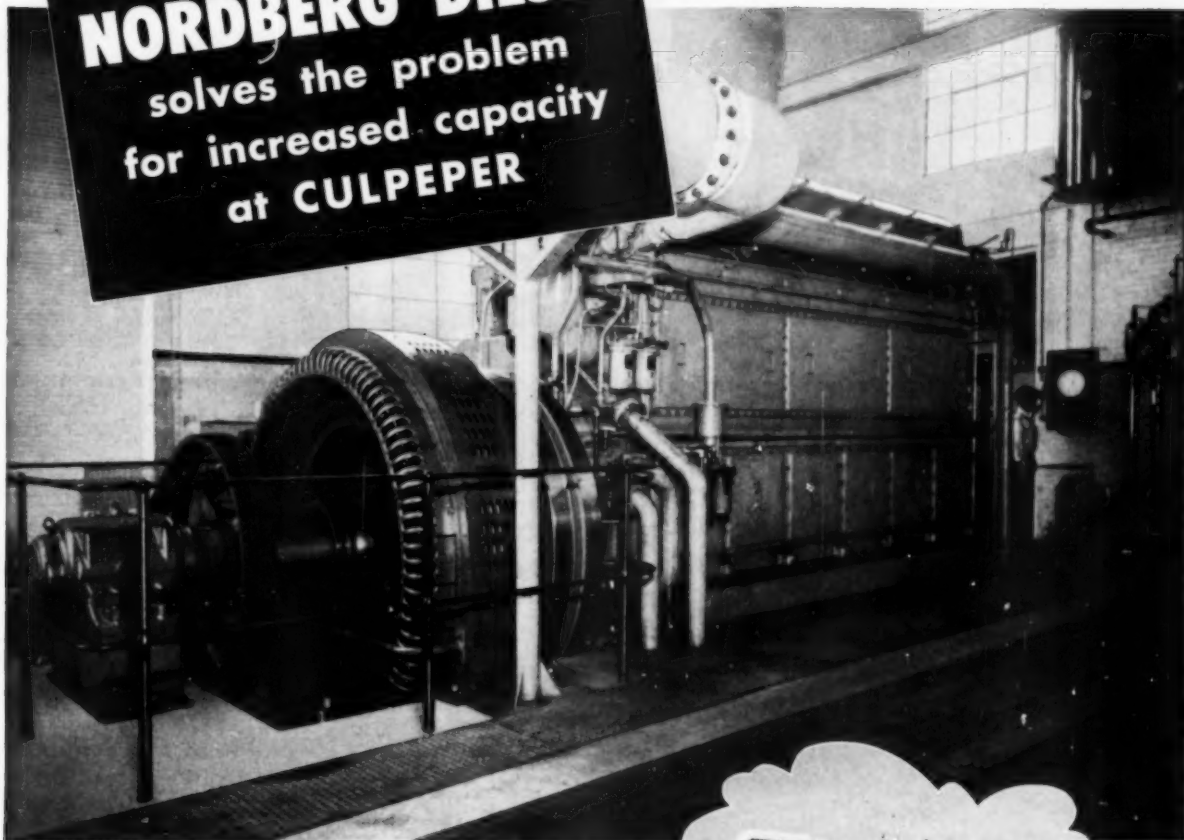
## **WALWORTH valves and fittings**

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# **NORDBERG DIESEL** solves the problem for increased capacity at CULPEPER



In 1934, the town of Culpeper, Virginia, switched from public utility power to its own Diesel powered generating plant. As the load grew, additional generating capacity was added, the latest addition being the 1220 H.P. Nordberg Supercharged Dual-fuel engine which was placed in service in 1948. This oil and gas burning engine has almost as much capacity as the other three units combined. Here is another example of how Nordberg Diesel Engines provide dependable low cost power to meet the increased capacity demands in electric utility and industrial power plants. Nordberg two and four-cycle engines are built in a wide range of types and sizes, from 10 to 8500 H.P. Write for details.

**NORDBERG MFG. CO.**  
**MILWAUKEE 7, WISCONSIN**

P-649



Nordberg 6-cylinder, 1220 H.P. Supercharged Dual-fuel Engine recently installed in the municipal power plant at Culpeper, Virginia where residents are celebrating the town's two hundredth anniversary.



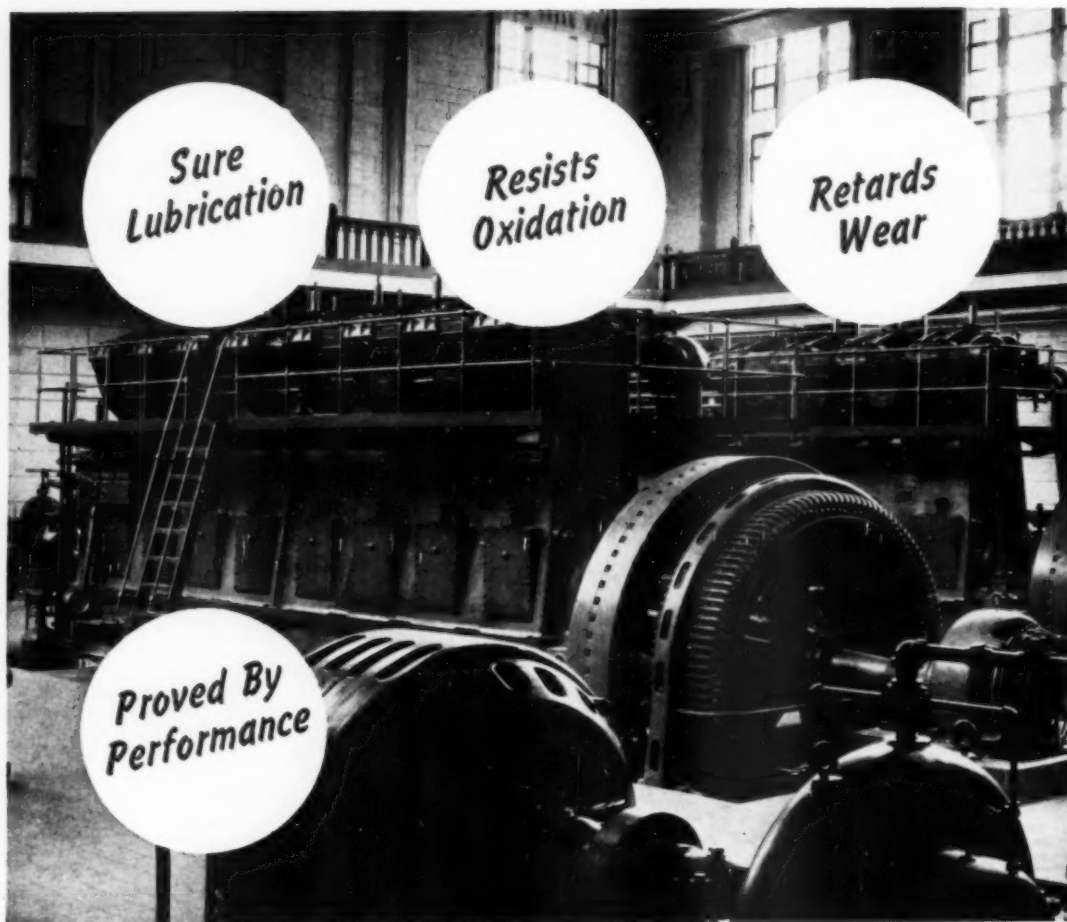
## **NORDBERG**

### **DIESEL ENGINES**





# **TROUBLE-FREE with Sinclair**




**SINCLAIR**

YOUR NEAREST SUPPLIER OF SINCLAIR PRODUCTS WILL GLADLY ARRANGE







# Diesel Operation RUBILENE

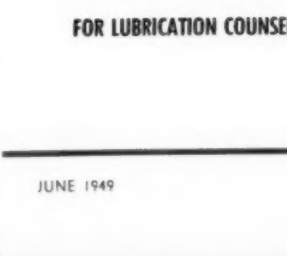






A big problem facing every diesel plant operator is how to get continuous, trouble-free operation from his equipment. This has been accomplished in many plants where Sinclair RUBILENE is the diesel lubricant. RUBILENE's reliability has been proved by thousands of hours of top performance in hundreds of installations.

Operators report low rates of wear and low maintenance under continuous high output demands. The merits of RUBILENE have been established through years of successful performance.



New Fluid Catalytic Cracking Stills (like the one shown here) are helping to expand Sinclair's refinery output. Sinclair's great refineries are now turning out products at the rate of 150,000,000 gallons of lubricating oil yearly.



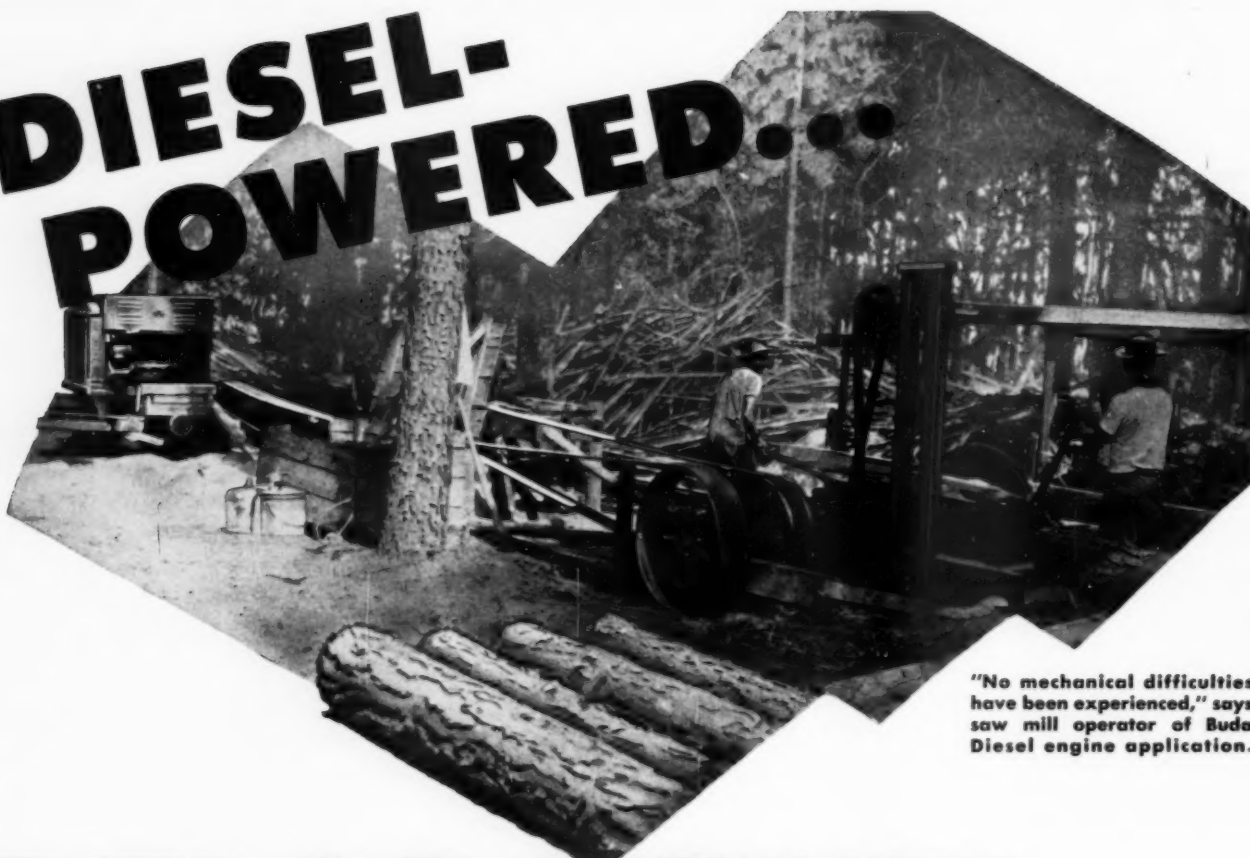
About 40% of all the Aircraft Engine Oil used by domestic Airlines in the U.S.A. is supplied by SINCLAIR. The same careful research that developed this high quality oil for the Airlines is put into RUBILENE and other Sinclair Oils.

## INDUSTRIAL OILS

FOR LUBRICATION COUNSEL, OR YOU MAY WRITE TO SINCLAIR REFINING COMPANY, 630 FIFTH AVE., NEW YORK 20, N. Y.



# DIESEL-POWERED...



"No mechanical difficulties have been experienced," says saw mill operator of Buda Diesel engine application.

## DELCO-REMY EQUIPPED



DELCO-REMY—A UNITED MOTORS LINE  
Service Parts and Delco Batteries  
Available Everywhere, Through  
UNITED MOTORS DISTRIBUTORS

Delco-Remy electrical equipment is "on the job" with Diesels as they prove their economy and dependability on every kind of application.

Today's compact, efficient Diesel engines have come a long way since the bulky pioneering models. And Delco-Remy has been with the Diesel industry all the way, matching progress with progress to meet the changing needs of improved engine design.

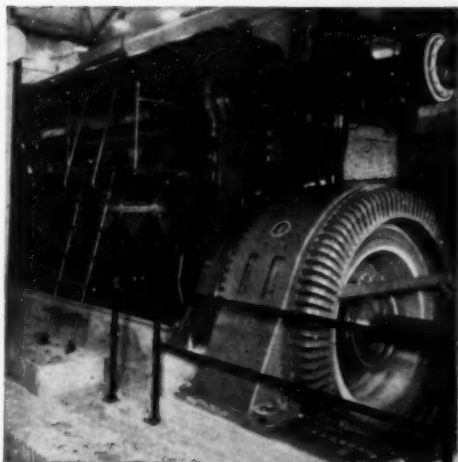
Diesel engine users and manufacturers respect Delco-Remy electrical equipment. The name Delco-Remy is good assurance of good performance.

## Delco-Remy

DIVISION, GENERAL MOTORS CORPORATION  
ANDERSON, INDIANA

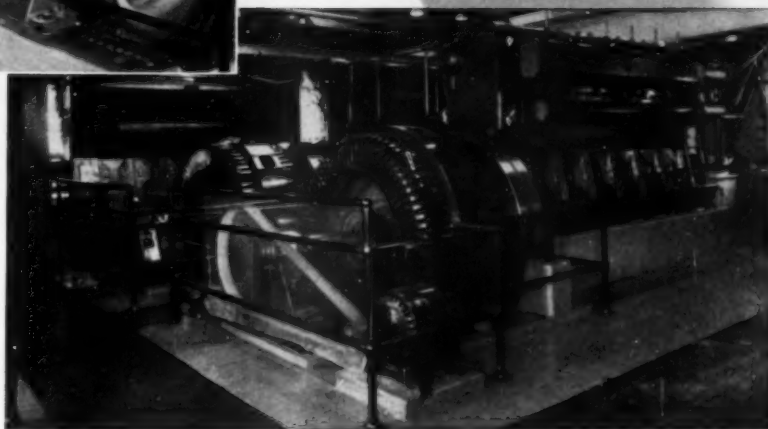
**DELCO-REMY • WHEREVER WHEELS TURN OR PROPELLERS SPIN**





# Gold

is where you  
find it



● Seven Superior Diesels helped a midwest quarry company find gold—gold in the form of reduced power costs. In only 12 years the use of Diesels reduced the cost of electrical power \$156,000, after all expenses, including depreciation, were deducted!

But Superior Diesels supplied more than a low cost source of power—they also provided a dependable one. The engines are operated at least 16 hours daily, 6 days a week, 52 weeks a year!

Over and over again we hear similar reports about the outstanding performance provided by

Superior Diesels. But that's not strange when you consider that Superior has all of the following advantages: Conservative Ratings ● Fuel Economy ● Precision Bearings ● Heavy Rigid Crankshafts ● Strong Bases and Cylinder Blocks ● Proved Roller Chain Camshaft Drive ● Oil Cooled Pistons.

Superior Diesels may be able to help you get gold from your power costs. We would like to discuss it with you—just drop us a line and tell us when it's convenient for you.

**THE NATIONAL SUPPLY COMPANY**  
SUPERIOR ENGINE DIVISION  
Plant and General Sales Office: Springfield, Ohio

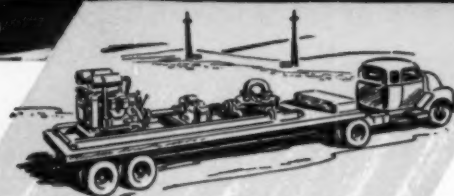


*Superior*  
**DIESEL**





## GM DIESELS "BOOST" Main Line Flow



Portable pumping unit designed around a General Motors Series 71 "Twin" by the Diesel Power Company of Oklahoma City for Phillips Petroleum Company

**T**O step up the flow of petroleum products in its 8-inch main line between St. Louis and Chicago, Phillips Petroleum Company has installed three of these completely portable pumping units.

A General Motors Series 71 Diesel "Twin 6," delivering 260 rugged continuous horsepower, drives a 4-stage centrifugal pump at 3600 r.p.m. through a speed increaser. Throughput is 32,000 barrels per day at 365 p.s.i. differential pressure.

GM Diesels were chosen for this work because their compact 2-cycle design—power at every

downstroke—makes them quick starting, smooth and dependable in operation and unusually powerful for their modest size and weight.

In fact, the entire pumping unit weighs less than 14,000 pounds—can be easily picked up and moved by truck for emergency installation anywhere on the line. No elaborate foundation is necessary.

For complete details of this sturdy, money-making, easy-to-maintain power, consult your GM Diesel distributor listed below or drop us a line.

### DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 200 H.P. DETROIT 26, MICHIGAN MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

**DIESEL BRAWN WITHOUT THE BULK**





**E**VERY Cycoil® Oil Bath Cleaner is just that—a death house for dust. And because this unit has been proven a sure cure for engine and compressor dust troubles, it's certain to be a sure source of savings to you.

Cycoil is a heavy-duty unit that's designed not to do just a partial job but to deliver practically 100% dust removal efficiency. Over 90% of the total fine dust content of the air is trapped in a Cycoil before reaching the filter section. The remaining dust then passes to the filter cells where it also is removed. Final result—approximately 100% cleaning efficiency plus positive oil circulation for self-cleaning action and large dust-holding capacity.

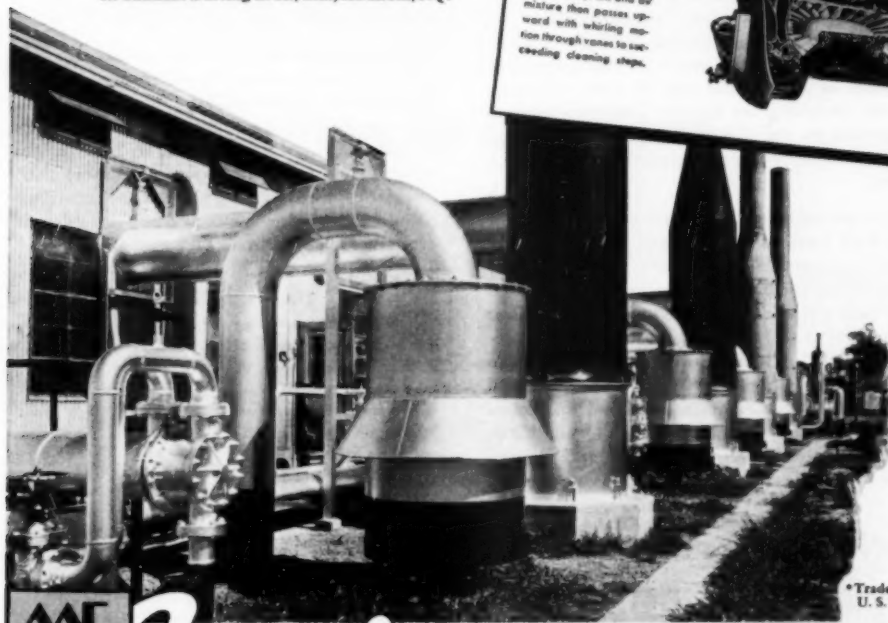
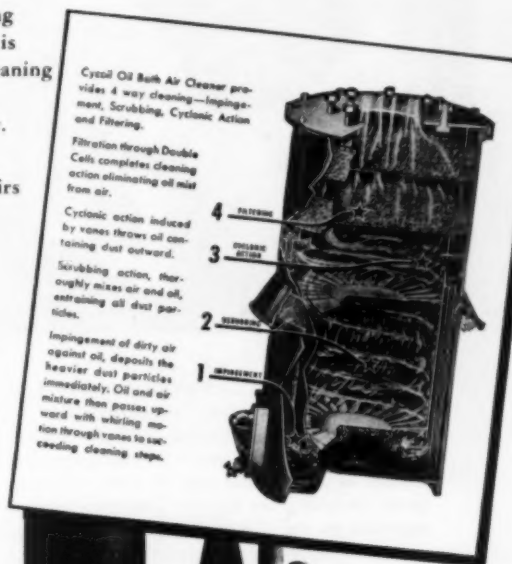
Anything less than Cycoil's almost perfect efficiency only postpones the day of costly repairs and shutdowns. If you want to settle your dust problems once and for all—write for Cycoil Bulletin 130-D today.

**AMERICAN AIR FILTER COMPANY, INC.**

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In Canada: Darling Bros., Ltd., Montreal, P.Q.

## DEATH HOUSE FOR DUST



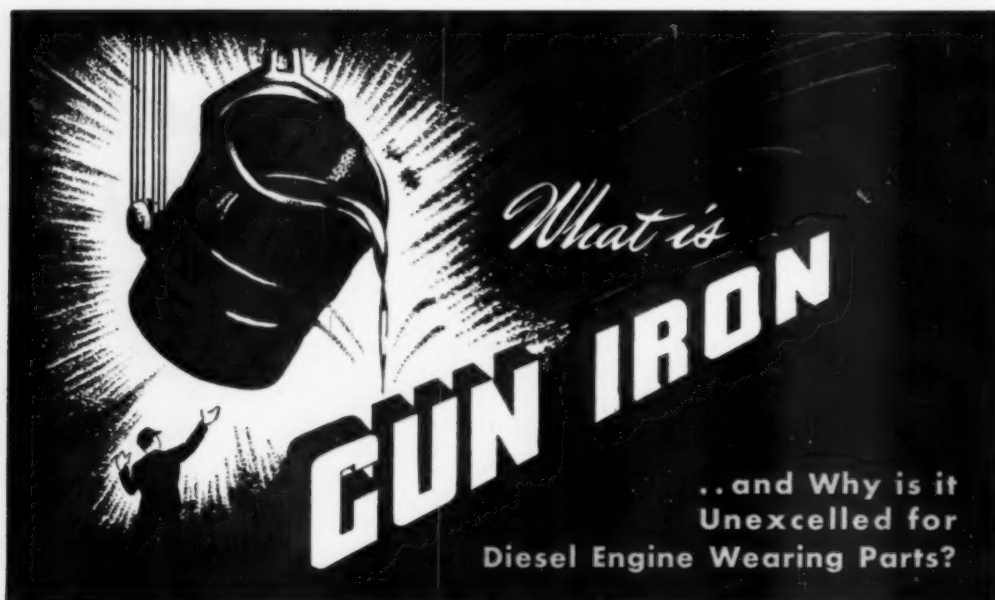
\*Trade-mark registered U. S. Patent Office.

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**Cycoil**

**OIL BATH AIR CLEANER  
AND INTAKE SILENCER**





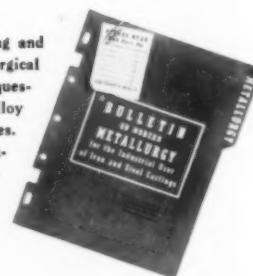
**H**unt-Spiller Gun Iron is not new. In fact, its original development dates back to the founding of this company in 1810. Through the years, it became widely known in the production of guns of many types, including the famous Dahlgren cannon mounted on the U.S.S. *Monitor* of Civil War renown. Hence, the adoption of the term "Gun Iron."

In its present form, it is recognized as one of the best materials available for diesel engine wearing parts. Melted in an air furnace (similar to an open hearth furnace), Gun Iron has uniform chemical, physical and structural characteristics . . . a 100% pearlite microstructure. Unalloyed Gun Iron has an average tensile strength of 40,000 PSI, as compared with 30,000 PSI for ordinary gray iron. When alloyed or specially quenched, its strength can be raised to 45,000-50,000 PSI and Brinell hardness increased from 215 to 450-500.

Strength and hardness will hold up to 850°F, with a strength loss of only 12% at 900°F.

In its application to diesel parts which are subject to friction—many of which are cast and machined by Hunt-Spiller—Gun Iron's dense, evenly-graphited structure and uniform strength and hardness offer superior resistance to heat, wear and distortion. These same characteristics also assure more consistent machineability in the shop and more reliable and economical performance of the parts in use.

This interesting and highly informative metallurgical bulletin answers many questions as to what metal or alloy is best for specific purposes. Your copy will be sent, without obligation, upon request on your company letterhead.

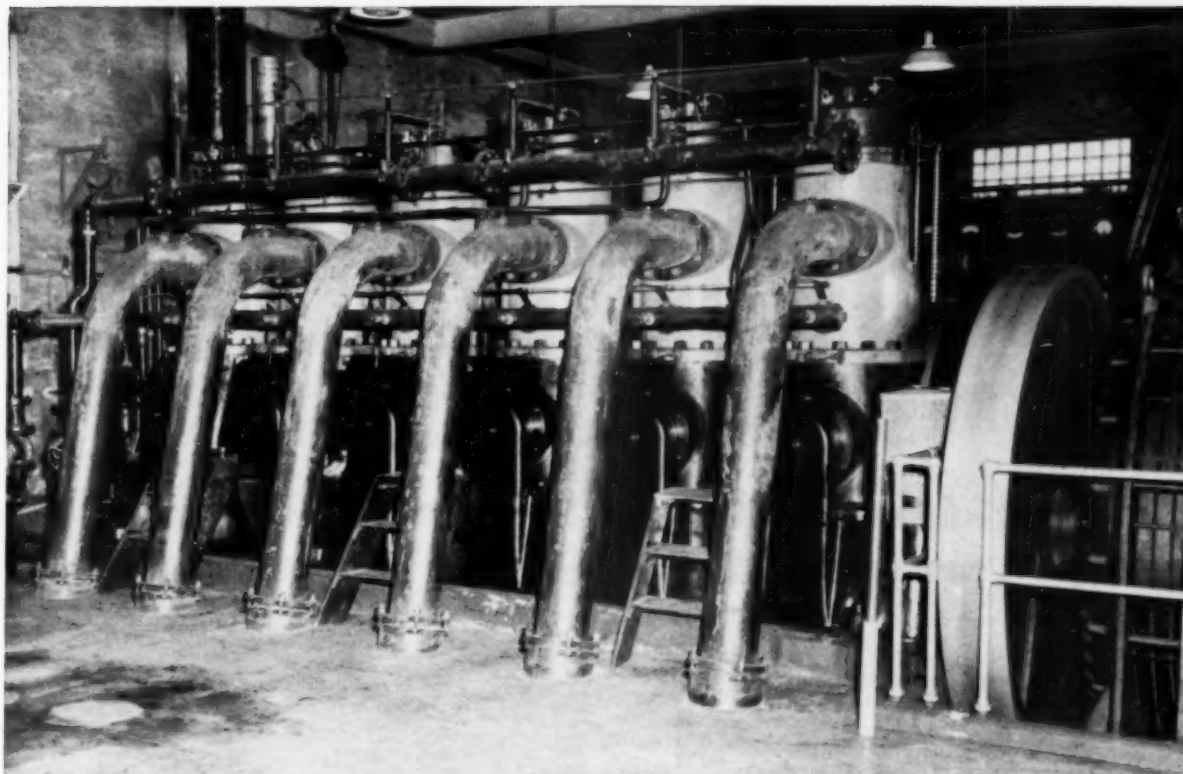


**HUNT • SPILLER**  
MANUFACTURING CORPORATION

387 DORCHESTER AVENUE • SOUTH BOSTON 27, MASS.

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## Isn't this saving in lubricant worth getting?

YOUR Diesel engines need not have lubrication troubles in order to benefit by a switch to Nonpareil HD Diesel Oil. This is shown by the experience of a midwest municipal power plant with the 360-HP FM Diesel shown above.

Maintenance costs for the engine were moderate. Efficiency was satisfactory. Nevertheless, the plant operators were continually on the lookout for ways to improve operation. That point of view led to a trial of Nonpareil HD Diesel Oil... with this surprising result:

**The engine had previously produced an average of 1500 kw-hr per gallon of lubricant. With the switch to Nonpareil HD, that figure was boosted to 2500 kw-hr—an increase of 1000 kw-hr—a worthwhile reduction in lubricant consumption!**

On the basis of such savings alone, wouldn't it be worth your while to try Nonpareil HD Diesel Oil? Actually, you can

**NONPAREIL HD  
DIESEL OIL**

profit other ways with this superior heavy duty lubricant. For many other Diesel operators, Nonpareil HD has meant less wear and cleaner engines. These benefits testify to greater savings for you. A trial will prove them. Ask for the services of a Standard Oil Lubrication Engineer.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

**STANDARD OIL COMPANY (INDIANA)**







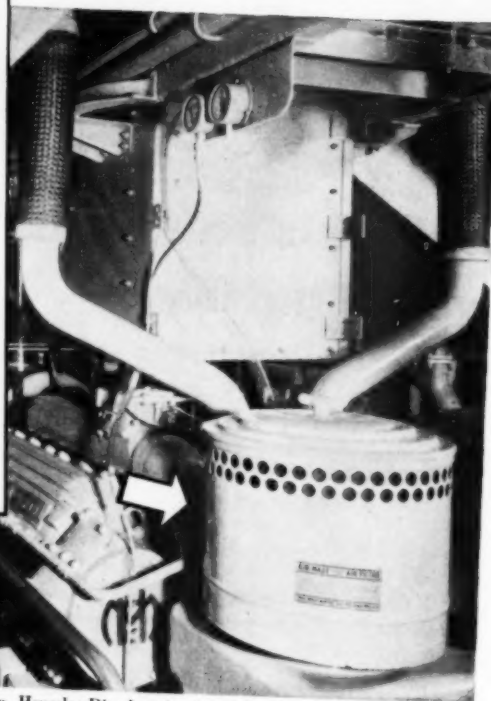
**THIS NEW DEPARTURE** in railroad train construction was announced recently by The American Car and Foundry Company.

## Air-Maze filters clean engine air on new A.C.F.-Talgo locomotive

**T**HE new A.C.F.-Talgo locomotive is powered by four Hercules Diesel engines. The two main engines deliver motive power and two auxiliaries supply all train power.

Each engine air intake is protected by an Air-Maze oil bath air filter. Every cubic foot of air entering each engine is thoroughly scrubbed in oil, removing practically 100% of abrasive dirt and dust.

Air-Maze air filters and filter-silencers are available in capacities from 25 c.f.m. to 6500 c.f.m. All metal construction, easily serviced, low pressure drop, highly efficient. Special valve models for compressors and gas engines. Write for full information. AIR-MAZE CORPORATION, 5200 Harvard Avenue, Cleveland 5, Ohio.



**AIR-MAZE** oil bath air filter shown in foreground protects each 405 h.p. Hercules Diesel engine from dirt, dust and grit.

**AIR FILTERS  
SILENCERS  
SPARK ARRESTORS**

**AIR-MAZE**  
THE FILTER ENGINEERS

**LIQUID FILTERS  
OIL SEPARATORS  
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## EXTENDS *TIME* BETWEEN ENGINE OVERHAULS

### Cuts engine wear!

**Anti-corrosion action cuts engine wear.** The dominant role of acid-corrosion in Diesel engine wear has been established beyond doubt through more than 5 years of testing with all types of engines. Hundreds of thousands of engine hours—hundreds of carefully kept records—show that Shell Rotella Oil counteracts acid corrosion . . . counteracts acid products of incomplete combustion, particularly when jacket temperature is low.

**Tougher oil films cut engine wear.** Mineral oils have a natural ability to form protective coatings

between rubbing or sliding parts. Shell scientists have found a way to multiply this film strength, thereby increasing lubricating quality.

**"Black Magic" Dispersant prevents harmful deposits.** In this new oil an important discovery of Shell Research gives more effective dispersant properties than was hitherto thought possible. Drainings are black—proof that harmful engine deposits come out, instead of staying behind to build up and cause trouble.

The Shell lubrication engineer will give you sound advice about the lubrication of any type of Diesel. For further information, write Shell Oil Company, Incorporated, 50 West 50th Street, New York 20, N. Y., or 100 Bush Street, San Francisco 6, Calif.



## SHELL ROTELLA OIL FOR *ALL* DIESELS





● Aluminum bearings decrease running temperatures, eliminate hot spots. They remove heat fast . . . distribute it fast. Thousands of hours of actual operation prove aluminum bearings

## PROVIDE FAST HEAT TRANSFER

Bearings of Alcoa Aluminum have low coefficients of friction. They resist corrosion . . . carry heavy loads. They are bearing metal all the way through.

Leading bearing manufacturers finish and supply these sound, high-quality castings. Look for them on the next diesels you buy.

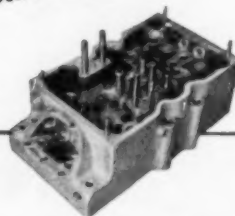
Aluminum Company of America  
2141 Gulf Building, Pittsburgh 19, Pennsylvania.



**PISTONS**—Get the proved advantages you've enjoyed in Alcoa Aluminum Pistons, in these other diesel parts.



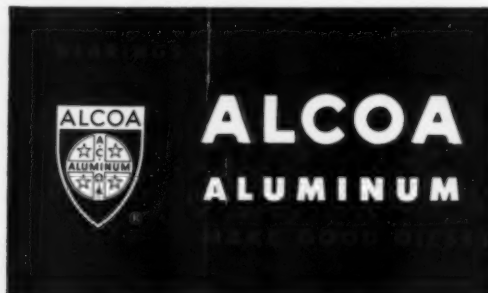
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HR-4 110 hp

HR-6 130 hp

HR-8 155 hp

HR-10 200 hp

HR-12 225 hp

HRS-6 225 hp

HRS-8 250 hp

HRS-10 275 hp

NHRS-6 300 hp

NVH-12 400 hp

NVHS-12 550 hp

# 5 New CUMMINS DIESELS

- 1 HR-400—110 hp (max.), at 1800 rpm.  $5\frac{1}{8}$ " bore, 6" stroke.
- 2 HRS-600—225 hp (max.), at 1800 rpm.  $5\frac{1}{8}$ " bore, 6" stroke. Supercharged.
- 3 NHRS-600—300 hp (max.), at 2100 rpm.  $5\frac{1}{8}$ " bore, 6" stroke. Supercharged.
- 4 NVH-12—400 hp (max.), at 2100 rpm.  $5\frac{1}{8}$ " bore, 6" stroke.
- 5 NVHS-12—550 hp (max.), at 2100 rpm.  $5\frac{1}{8}$ " bore, 6" stroke. Supercharged.



With the addition of 5 new engines, there's now a Cummins Diesel for any power job in the 50 (minimum) to 550 (maximum) hp range. Sixty-six individual models are available . . . with optional equipment to fit your specific operating requirements. Compounded units increase the Cummins range to 1440 hp.

The all-around economy of Cummins Diesels increases your profits on any automotive, marine or industrial job. Standardizing on Cummins Power gives you these additional advantages: engines, units and assemblies are interchangeable . . . service problems are simplified . . . replacement parts inventories are reduced . . . downtime is held to a minimum.

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA



*From the Raw Material*



*to the Finished Product ~*

**T**RADING the "king of the jungle" from his wild, unfettered life on the veldt to please the patrons under the big top may be a far cry from producing a diesel crank . . . at first casual glance . . . but is it? Raw materials correctly selected, carefully blended, unceasingly controlled by metallurgical analysis reach the ingot stage here at Erie Forge Company . . . and then the skillful "whip" of engineering procedure begins to shape the steel for performance profitable and pleasing to power producing diesel engines . . . Watching each successive

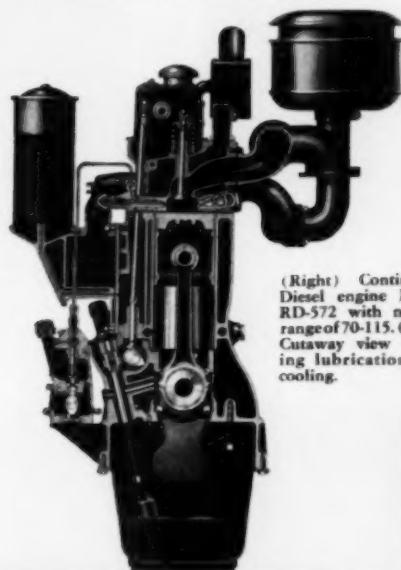
step from forging hammer, through machine shop to heat treating and soaking pits, Erie Forge "trainers" finally release the "King of Diesel Cranks" to do their bidding in harnessing the diesel's power for industry on land and sea. This unique "training", this refining, this "know how", is the priceless ingredient inbred in cranks, connecting rods, drive shafts and steel castings completely made within the walls of Erie Forge Company. Consult with us on your specification requirements—We can work together profitably.



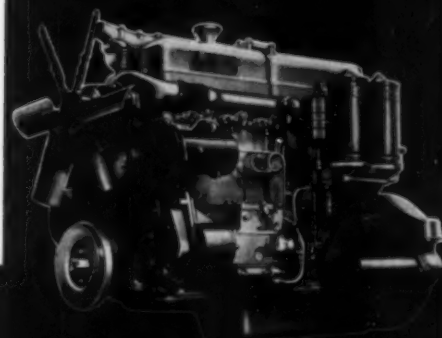
**ERIE FORGE COMPANY, ERIE, PA.**







(Right) Continental Diesel engine Model RD-572 with net hp range of 70-115. (Left) Cutaway view showing lubrication and cooling.



## TWO GREAT OILS for automotive Diesel engines

This is the third of a series of ads featuring well known automotive Diesel engines. The manufacturer of Continental Diesel engines has approved these two great oils, among others.

**GULFPRIDE DIESEL** the world's finest Diesel Oil — Alchlor-processed

**GULFLUBE MOTOR OIL H. D.** high quality — Multi-Sol-processed

**Gulfpride-Diesel**, the world's finest Diesel Oil, is superrefined by Gulf's exclusive Alchlor Process, an extra refining step that discards as much as 15% of a conventionally refined oil. This 15% contains the hydrocarbons most apt to oxidize during engine operation to form sludge, varnish, and other objectionable engine deposits.

**Gulfpride-Diesel** is compounded with the proper amount of detergent-dispersant additive—holds soot particles in suspension. **Gulfpride-Diesel** keeps engines cleaner and smoother running, is setting new performance records in the maintenance of all types of automotive Diesel engines.

**Gulflube Motor Oil H. D.** is an outstanding heavy duty type oil at a competitive price. Refined from paraffin base crudes by Gulf's special Multi-Sol Process.

For further information on these two fine oils and for expert help on other phases of Diesel engine lubrication, call in a Gulf Lubrication Engineer today.

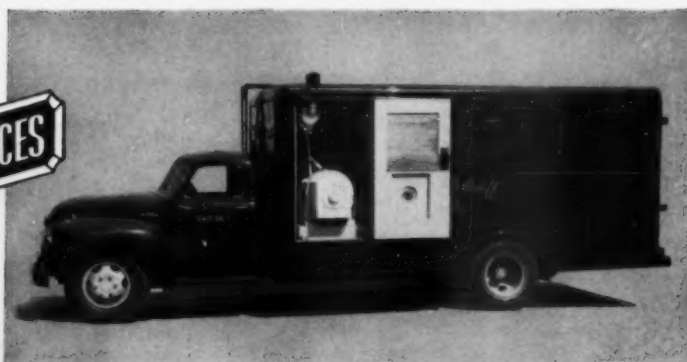
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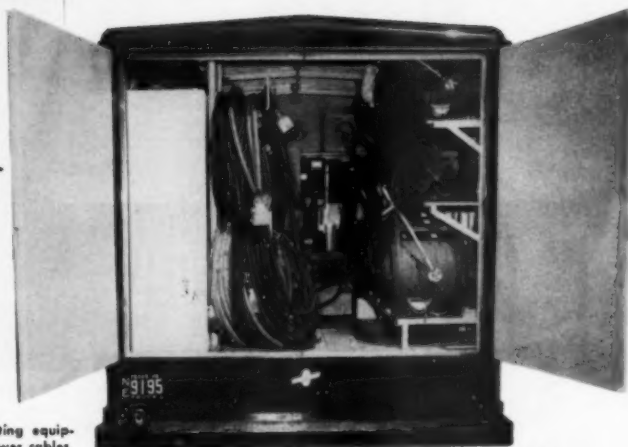
Side view of traveling studio showing 60 kw. generator set.

# POWER IS NO PRODUCTION PROBLEM

AT

*Raphael G. Wolff*  
STUDIOS • HOLLYWOOD

Wherever the location . . .  
whatever the job . . . Wolff Studios carry  
their own power and lights in this  
Stewart & Stevenson mobile power station.



Interior view showing lighting equipment, control panel and power cables. Cameras are stored in cabinet at left.

Industrial movies and business films pose many unique problems that have been successfully solved by the use of this truck-mounted motion picture outfit manufactured for Raphael G. Wolff Studios of Hollywood by Stewart & Stevenson Services.

More than just a generator set, this unit carries all the cameras, lights, cables and other equipment necessary to make fine motion pictures. The specially fabricated body is mounted on a 3-ton GMC truck. Electric power is supplied by a 60 kw. GM Diesel powered generator mounted in the front section of the body. This reliable power unit makes possible the production of movies in remote locations where other power sources are not available.

By carrying all equipment in one truck, a great deal of transportation expense is saved. This saving, combined with the reduced setup time required, enables the Wolff Studios to make fine movies on any location at moderate cost. They have found this method of operation so successful that they have ordered another unit of similar design.

Stewart & Stevenson Services handle all phases of design, manufacture and assembly of these units under one turn-key contract—and one fixed responsibility.

You may not require all these services on one job but if you want reliable mobile power units, durable truck bodies or guaranteed engine installations, your best bet is Stewart & Stevenson Services.

## STEWART & STEVENSON SERVICES, Inc.

4516 HARRISBURG BLVD.

HOUSTON, TEXAS

THE NATION'S LARGEST DISTRIBUTOR OF GM DIESEL ENGINES







# \*POUR POINT

Today, it is essential to use the best lubricants money can buy — for maximum efficiency . . . lowest operating cost. That's why more and more production machinery is being lubricated with Tycol oils and greases.

Whatever your lubricating need — for turbine, steam engine, mine car or trolley, textile mill, stationary Diesel or locomotive — there's a Tycol high quality oil or grease exactly suited to your specific need.

In developing this comprehensive line, Tycol subjects each individual oil and grease to rigid tests during manufacture. This control assures the required lubrication characteristics — \*POUR POINT, viscosity, color, penetration, to name a few — for maximum performance of that particular product.

Let us show you the extra value in every measure of Tycol oil and grease. Write your nearest Tide Water Associated office today.



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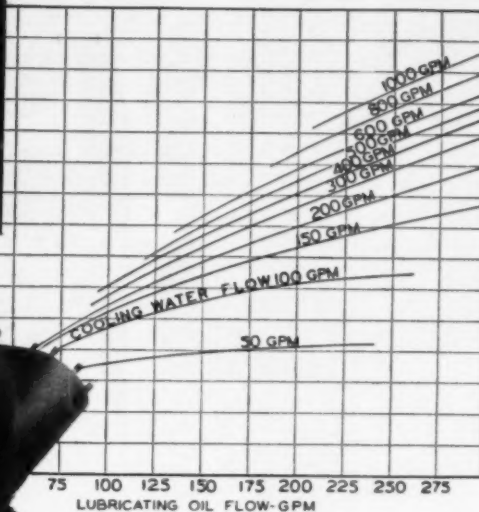


**\*LEARN WHAT THIS PRODUCT CHARACTERISTIC MEANS TO YOU — READ "LUBRICANIA"**  
This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

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**SOUND ENGINEERING-RUGGED DESIGN  
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**Consult Harrison  
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# DIESEL *and* GAS ENGINE PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR • UNDERGROUND

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### FRONT COVER ILLUSTRATION:

A four-unit Electro-Motive diesel-electric locomotive pulling one of the California Zephyrs in Glenwood Canyon on the Denver Rio Grande Western Railroad.

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California Zephyr entering Moffat Tunnel on the Rio Grande.

## SIX CALIFORNIA ZEPHYRS COVER 3-SYSTEM ROUTE

By CHARLES F. A. MANN

**A**FTER extra-long delays incident to building and equipping six of the most elaborate Transcontinental streamlined trains ever built, six complete luxury sleeper-coach trains comprising 66 Budd-built all stainless steel cars, five on each train which are of the Budd-Burlington evolution of the observation dome type of 2-level cars, known as "Vista Dome Cars."

The striking design of each of the six trains which will provide fast daily schedules on the 2532 mile mid-continent route between Chicago-Denver-Salt Lake and San Francisco, over the Burlington Railroad for 1034 miles between Chicago and Denver; the Rio Grande's 570 mile scenic route between Denver and Salt Lake City and 928 miles of Western Pacific between Salt Lake and San Francisco, is evident in the mere external appearance of the trains.

In a race between the General Motors-Pullman Company's design of their observation dome type cars in the "Train Of Tomorrow," the Burlington-Budd trains have shorter, more compact and less elaborate dome facilities. Each car is constructed of 100% stainless steel throughout, by the Budd Shotweld system, and is unusually strong in design and carries the dome over a depressed section of the underframe by an ingenious type of three-point truss system running along the sides of the depressed sections under the domes.

Each train consists of a baggage car, three Vista Dome coaches, a Vista Dome buffet-lounge car, two 6-bedroom, 10 roomette cars, a diner, a 16 section semi-enclosed sleeper, a 6-bedroom ten roomette car and a Vista Dome lounge-observation car having a drawing room and three bedrooms.

Each train seats 138 regular coach passengers and 72 in the domes in the three coaches. There are 19 buffet and seven lounge seats in the buffet-lounge-dormitory cars available also for coach passengers. Sleeper space for 107 passengers is available. The Vista Dome observation-lounge car seats 50 people.

All coaches except the baggage cars are 85 ft. long and have one vestibule only. The buffet lounge and diners have no vestibules. Curved stairways reach the Vista Domes in all cars, which are heavily constructed of stainless steel members and sun-filtering shatterproof glass.

The trains are replete with all the fastidious features of stainless steel kitchens in the diners; large under-dome washrooms for men and women in the coaches; program and radio service on the train intercom set between sleeper and other sections of the train, a combination of fluorescent and incandescent lighting, and the first large-scale application of the Budd Disc Brakes, which eliminates the grind of brake shoes on the wheels.

Shatterproof double glass windows; use of bottled propane gas for cooking; dual mechanical refrigeration and an ingenious "Air Curtain"; circulating ice water and individual radio in all bedrooms—many features too numerous to mention—make the trains distinctive, costly and comfortable, as well as spectacular.

The object of serving the mid-continent cities on the three-system route with a fast, luxurious train in daily two way service, yet traverse the two scenic gems of the route each way in daylight to give the Westward-Ho Tourists a real thrill at seeing America at its best from the dome windows, was neatly achieved by traversing the Moffat-Tunnel-Colorado Rockies section and the California Feather River Canyon in full daylight, with convenient arrivals at each terminal.

Valets, hostesses, bottle warmers, drink icers, tight-lock couplers, reserve power supply and all the practical comforts of modern car design plus a lot borrowed from modern hotels and steamships go to make the consist of these trains unique. Bedrooms, designed by Budd, are different in that their combolet basin-toilet units are all in enclosed rooms on the inside of the cars, thus saving precious window space and assuring daytime privacy. Two Budd bedrooms make a drawing room of great day-night flexibility.

The motive power to pull the trains on their fast schedule across Illinois, Iowa, Nebraska and Colorado flatlands, including the long gentle climb to mile high Denver, will consist of three regularly assigned 3-unit 4500 hp. E.M.D. F-3 type medium high-speed diesels, from the Burlington's vast pool of diesel units. The units of these 3 locomotives all have extra reserve water capacity and three heating boilers. Since all air cooling in summer is by Frigidaire electro-mechanical units, no steam capacity is necessary for summer

cooling loads. Axle driven power units consist of 25 and 30 kw. generators operating through Spicer drives.

Two 6000 hp. ALCO diesel locomotives (Rio Grande Class DE 3 (A1A-A1A)) will provide the motive power by which the Denver and Rio Grande Western Railroad will move the "California Zephyr" between Denver and Salt Lake City when the transcontinental streamliner goes into daily service on March 20th.

Statistically speaking, these 3-unit ALCO diesels look like this:

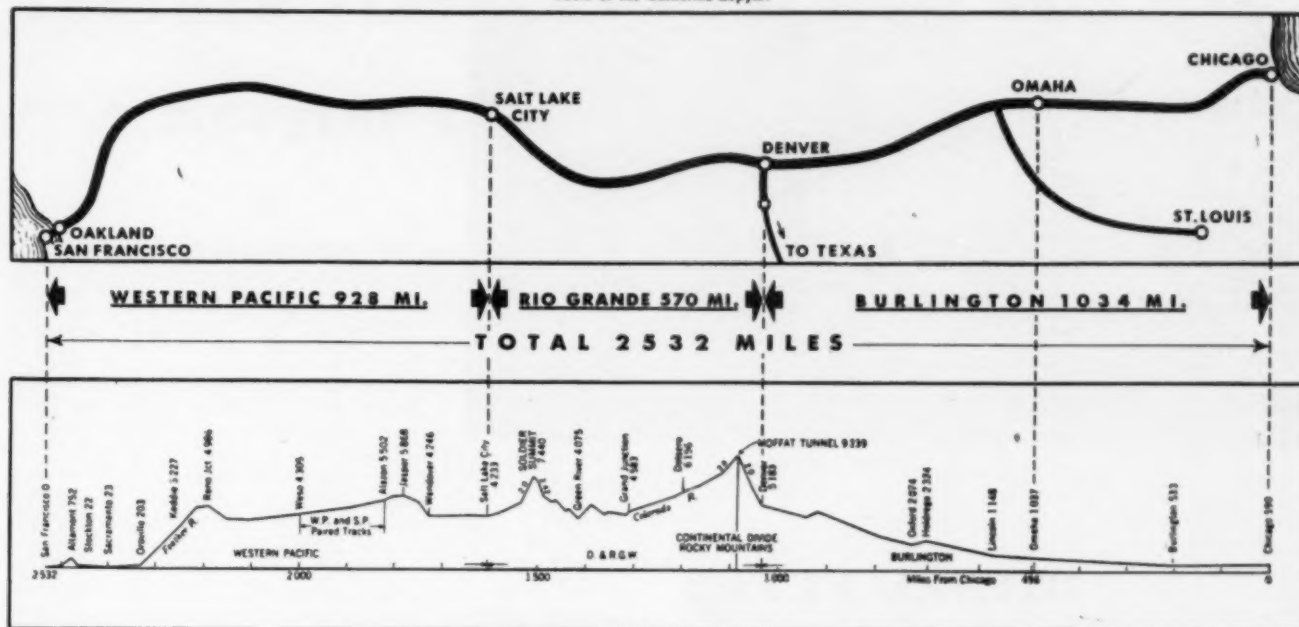
Wheel Diameter	—40 inches
Total Weight on Drivers	—613,320 pounds
Total Weight	—919,980 pounds
Tractive Effort	—147,792 pounds
H.P. Rating	—6000 pounds
No. of Cylinders	—16. The locomotive consists of 3 16 cylinder 4 cycle V-type engines.
Bore and Stroke	—9 x 10½
Gear Ratio	—64 to 19
Fuel Oil Capacity	—3600 gallons
Lub. Oil Capacity	—750 gallons
Cooling Water Capacity	—900 gallons

The locomotives are equipped with steam generators. The individual units have rubber draft gears. A dynamic braking system makes it possible to reverse the current and use the locomotives as a braking force. In the event that the ALCO locomotives must go out of service, the Rio Grande has 9 Electro-Motive Diesels available for passenger service which could fill the breach. Principal maintenance functions will be performed at Denver with the Salt Lake City terminal also equipped to maintain the locomotives. Schedules provide for an over-night layover at each terminal point. Fueling will also be handled at Denver and Salt Lake City.

On the Rio Grande Railroad segment, involving the heavy mountain grades and the long Moffat Tunnel operation back of Denver, either 4-unit E.M.D. 6000 hp. diesels geared for 75 mph. operation and full dynamic braking, to maintain constant speed over all sections of the route, or new 3-unit 6000 hp. Alco Class D.E. 3 units, each unit of which is powered with a 16 cylinder 9 x 10½ 4 cycle supercharged diesel engine are used.



Route of the California Zephyr.



Profile View  
Route through the California Rockies and Feather River Canyon.

A full description of the Alco units, two of which are regularly assigned to the service.

On the Western Pacific segment of the route between Salt Lake and San Francisco, again 3-unit E.M.D. F-3 type diesel locomotives are assigned for medium high speed operation with plenty of pull on the mountains. Because of favorable grades on the Western Pacific, 4500 hp. of diesel locomotive is enough to more than maintain schedules on the route.

The fleet of 6 California Zephyrs, largest and cost-

liest postwar fleet of trains put into service at one time, in effect are operated and built as a solid unit, despite the three way split of ownership among the three railroads participating, on an investment pro-rata basis figured out to balance the mileage of the territory served by each system.

The Burlington owns 27 cars of the fleet; the Rio Grande 15 and the Western Pacific 24. So identical are the cars that the customers won't know which railroad owns the car he's riding in except those observant passengers who know where to look for the name plates. Every comfort for the

stewards, conductor, hostesses and diner crews has been provided, right down to staterooms with baths. Both crews and passengers ride in style on the Zephyrs.

With a 3:30 P.M. daily departure and a 4:30 P.M. arrival in San Francisco, with neatly figured arrival times at key intermediate points, the trains are on what is practically a 49 hour schedule both ways.

Another step towards the dieselization of the nation's railways has effectively been proven.

Three-Section Electro-Motive Locomotive hauls California Zephyr on the Burlington out of Chicago.







Mixture of gravel and water pours through sluice into transport barge.

## DIESEL FLEET DREDGES RIVER BED

**D**IESELS man the pump and propellers of an efficient flotilla that takes 240 tons of gravel an hour from the bed of the White River at Batesville, Arkansas, in a mobile, water-borne, pumping operation developed by Galloway & Jeffery Company.

Known as Arkansas' biggest gravel supplier north of Little Rock, this firm uses three diesel-engined barges in dredging the river bed. One carries the suction pump and tube, while the others, each of 150-ton capacity, transport gravel from mid-

stream to the washing plant on the river bank.

An International UD-18 Diesel, engines the pump boat. The transport barges are constructed of war surplus steel pontoons lashed together to support wooden settling tanks, and are driven by war surplus marine diesels.

At the start of operations, the pumping unit is towed out to location by one of the barges and there anchored. The barges are then operated alternately, one being unloaded at the riverside

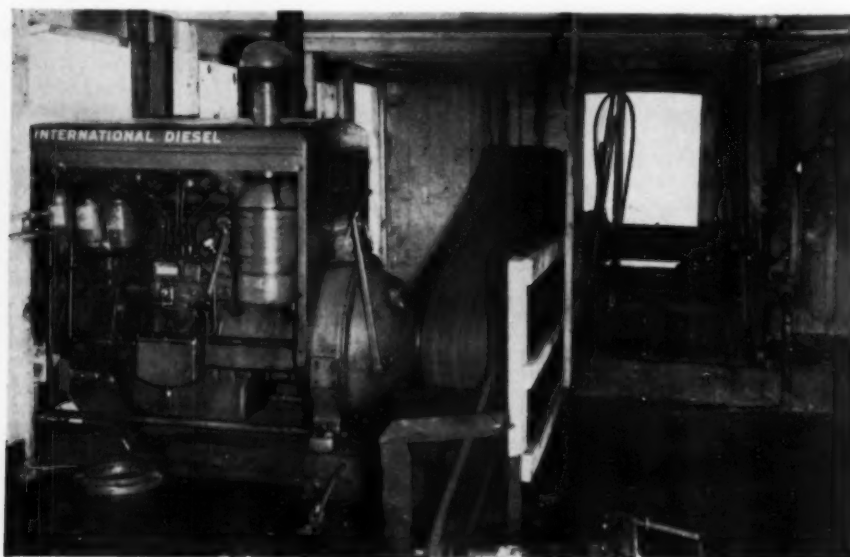
plant while the other is being filled in midstream.

The river-bed gravel is raised from a depth of 20 feet below the surface by an eight-inch, heavy-duty "Lightning" dredge pump manufactured by the Hay Press Company of Kansas City. It is driven at 400 rpm. by the UD-18 Diesel engine which operates at normal governed speed of 1600 rpm., through a 10-V-belt drive from a 12-inch engine take-off pulley to a 48-inch pump sheave.

From the river bottom, the mixture of sand and gravel is lifted to the top of the boathouse and directed, through a sluice running across the roof, into a barge moored alongside. To avoid capsizing the barge, gravel is evenly distributed by the use of a swing gate on the end of the sluice. With the gate raised, gravel and water travel to the far side of the barge; moving the gate to the vertical position forces the mixture to pour into the near side.

Six to eight barge loads of gravel are used daily by the plant, according to F. L. Galloway, principal in the firm. It takes approximately 30 minutes to load each barge with an average 120 tons.

At the bank, they are unloaded by an American Hoist and Derrick Company derrick equipped with a one-yard clamshell. The clamshell transfers the gravel directly from the barge to the hopper of the washing and screening plant.



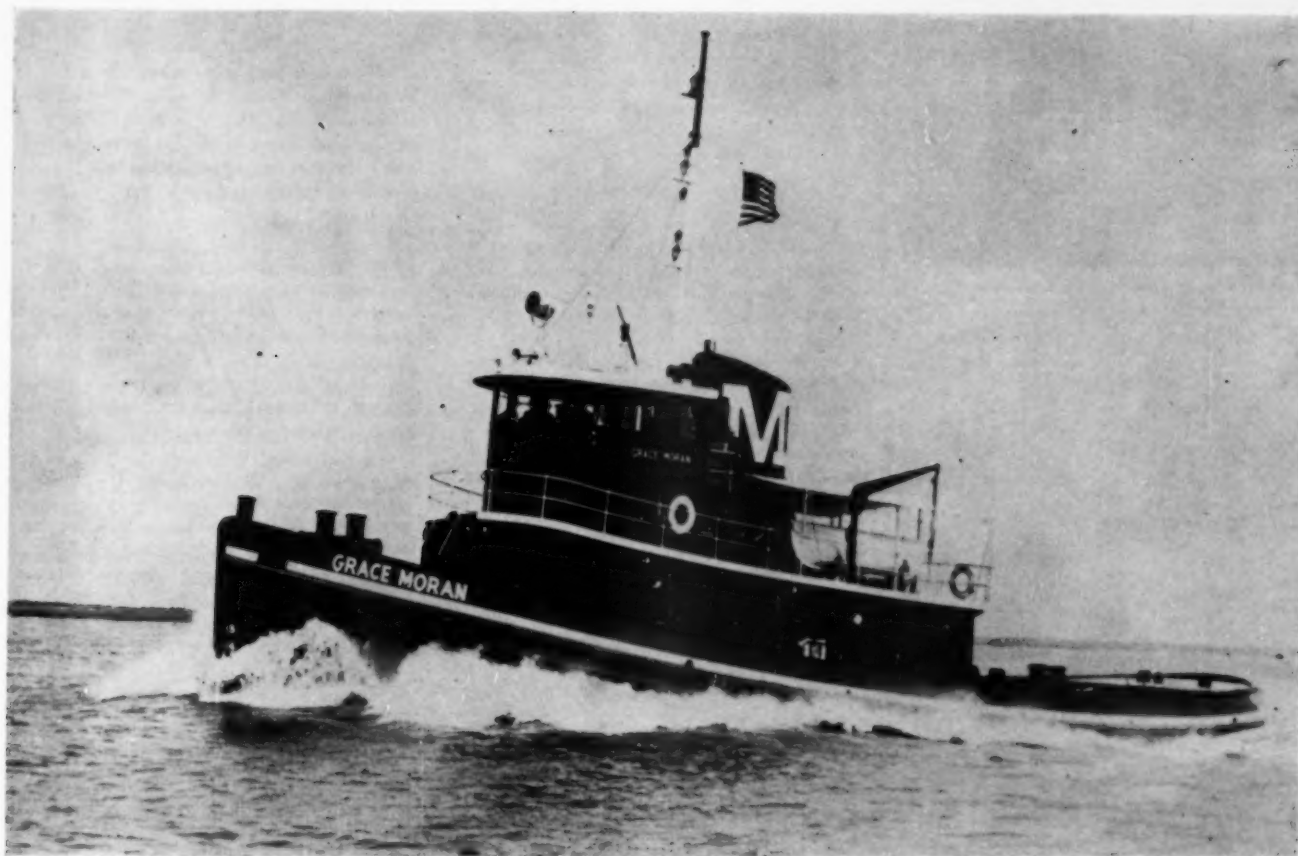
Clamshell unloading gravel from diesel driven barge.



100 horse-power, International UD-18 diesel drives "Lightning" pump on Gravel Dredge.



# ANOTHER CLEVELAND ENGINED TUG-BOAT FOR NEW YORK HARBOR



"Grace Moran" during her trial runs at Orange, Texas.

ONCE again the traditional fire-boat and raucous whistle welcome has been accorded a Cleveland diesel engine tug-boat in New York Harbor. This time it was the sturdy *Grace Moran*, newest and most powerful of the great port's tugs making her bow after a 6½ day voyage from Orange, Texas, where she was built.

Described by George W. Codrington, vice president of General Motors and general manager of the corporation's Cleveland Diesel Engine Division, as "the finest harbor tug ever built," the *Grace Moran*, latest addition to the huge fleet of the Moran Towing and Transportation Company, will be used with the company's other modern tug-boats in docking the *Queen Elizabeth* and other giant trans-Atlantic liners.

The *Grace Moran* is the first of five new additions

to the Moran fleet already the largest in the world. They will be used to replace older steam tugs and will make Moran tugs practically 100% diesel-electric. Incorporating many innovations, the new vessel, as will be her sisters, is equipped with a 16 cylinder, 2-cycle, G.M. Cleveland model 16-278A diesel-generator unit, which supplies d.c. current to a 1530 s.h.p. 525 volt, 2300 amp. motor turning 600-750 r.p.m. which in turn is geared to the propeller.

When the main engine is shut down and lighting and power are required, the G.M. diesel-generator auxiliary on the port side of the ship is used. Located on the same side, are the two air compressors used for starting the main engine, the emergency lube oil and transfer pump as well as the storage batteries. At the forward end of the engine room, the lubricating oil cooler, fresh water

cooler, fuel oil transfer pump and fire pump control are installed. The fire pump, bilge pump, heating boiler, motor-generator excitor units, main generator control unit, refrigeration unit, salt and fresh water pressure units, and lubricating oil storage tank, are on the starboard side. The electric steering engine is aft.

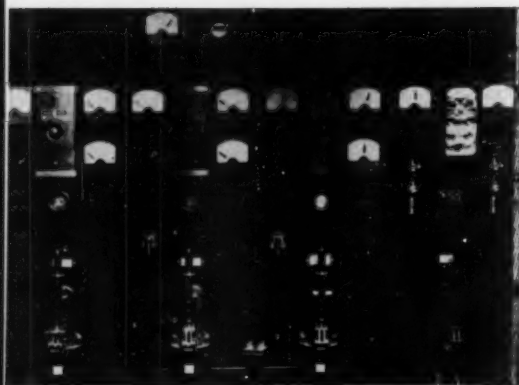
A compact galley fully equipped with range and other modern equipment takes care of the needs of a six-man crew.

Constructed of welded steel to American Bureau of Shipping requirements, the *Grace Moran* is a particularly fine vessel and she, and later, her sisters, will be a familiar sight to the many thousands of liner passengers entering and leaving New York's busy harbor.

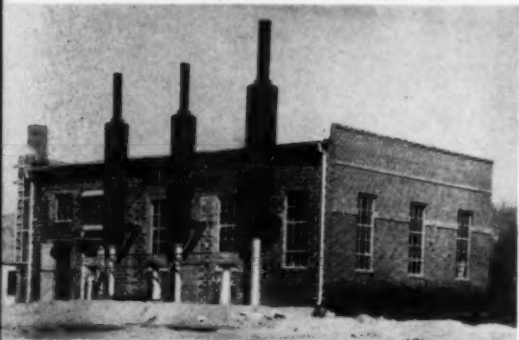


# PAXTON, NEBRASKA FINDS DIESEL PLANT

By T. J. MALONE



Four panel General Electric switchboard.



Three Burgess silencers at rear of power plant.

**P**AXTON, Nebraska, now a village of 600, experimented for twenty-five years with various means of giving its people electric service before finding the answer. Then, in 1941, it put a municipal diesel plant in.

At the beginning, after five years of owning and operating a steam-powered generating plant, it switched to high-tension service from a private utility. The utility was located at North Platte. Paxton used that service for ten years. It owned the transmission line as well as a distribution system.

Still seeking, it changed to purchase of energy from a municipal diesel plant in a neighboring town, joining the transmission line to that plant. After another ten years, it came to grips with the question: If they can do it, why not we?

Two two-cylinder, 120 horsepower, Fairbanks-Morse diesel engines, each of 76.8 kilowatt rated capacity, were put in operation December 1, 1941. The transmission line was sold.

Everything worked out. The plant as of April 30, 1948, end of the latest operation year, represented a valuation, without depreciation, of about \$83,500. Against this there were outstanding \$42,000 in revenue bonds—liens against plant earnings. On a total of \$68,000 of such bonds floated, earnings had paid \$26,000. The payments had included \$10,000 on bonds called before their due dates.

Paxton was paying for its investment in the plant

from plant earnings, with a working surplus left over at all times to care for necessary improvements apart from bond proceeds. For instance, it spent about \$7,000 in 1945 in rebuilding the distribution system. It didn't have to borrow; it took the money out of pocket.

The plant charges for everything, gives no so-called "free service," as for water pumping and street lighting. It wants to pay off the plant debt as soon as possible. Of course, when a plant gives services not charged for directly, it absorbs their costs itself—they have to be paid for—and the consumers pay those costs in their bills even if not realizing it.

In the first full operation year, ended April 30, 1943, generation volume totaled 226,631 kilowatt hours of energy. In the year ended April 30, 1948, generation was nearly twice as much, 532,854 kwh.

A desire for greater reserve capacity led to addition of a third diesel, also Fairbanks-Morse, which began operating in February, 1947.

This 3 cylinder, 225 horsepower, 148 kilowatt—gave a three-unit setup of 465 horsepower and a totaled 301.6 kilowatts. As the peak load in 1947-48 was 140 kilowatts, the plant had a standby of 115 per cent. This offered complete insurance against interruption of power. The two small units can handle the peak together; the larger one can handle it alone.

Performance of the plant in its six full operation-

Paxton's modern brick power building is attractively landscaped to meet the approval of any person living in the village.





# PAYS

years is indicated in the following table, which gives yearly generation volumes, fuel-oil output per gallon, average kilowatt-hour generation and delivered costs, and average kwh. revenue:

Operation year	KWH volume generated	KWH per gal. of fuel oil	Av. generation cost per KWH	Av. cost del. per KWH	Av. rev. per KWH
1942-43	266,631	10.00	1.26	...	...
1943-44	287,119	10.50	1.43	2.419	4.323
1944-45	303,622	10.74	1.49	3.830	4.422
1945-46	397,377	10.87	1.29	1.941	4.210
1946-47	456,527	12.23	1.84	2.398	3.176
1947-48	532,854	12.54	2.00	2.286	3.790

Marked increase in fuel-oil output per gallon for the last two years resulted from greater generation and higher load factor on the engines.

Jump in generation cost in 1946-47 reflects influence of higher fuel-oil prices as well as wage increases and use of additional labor; factors carried into the next year.

Operating receipts for 1947-48, all from sales of energy, were \$20,197.62 and operating expense was \$12,185.34, leaving a profit of \$8,012.28 for interest, retirement, depreciation and permanent improvements. On April 30, 1948, the cash surplus stood at \$8,525.94. Monthly consumer rates of the municipal plant since October 15, 1947 have been:

Residential: 8 cents for 25 kilowatt hours, 7 cents for 25, 5 cents for 50, 2 cents for excess, with a minimum of \$1.00 for 12 kwh;

Commercial light: 8 cents for 50 kwh., 5 cents for 250, 4 cents for 300, 3 cents for excess, with a minimum of \$1.00 for 12 kwh;

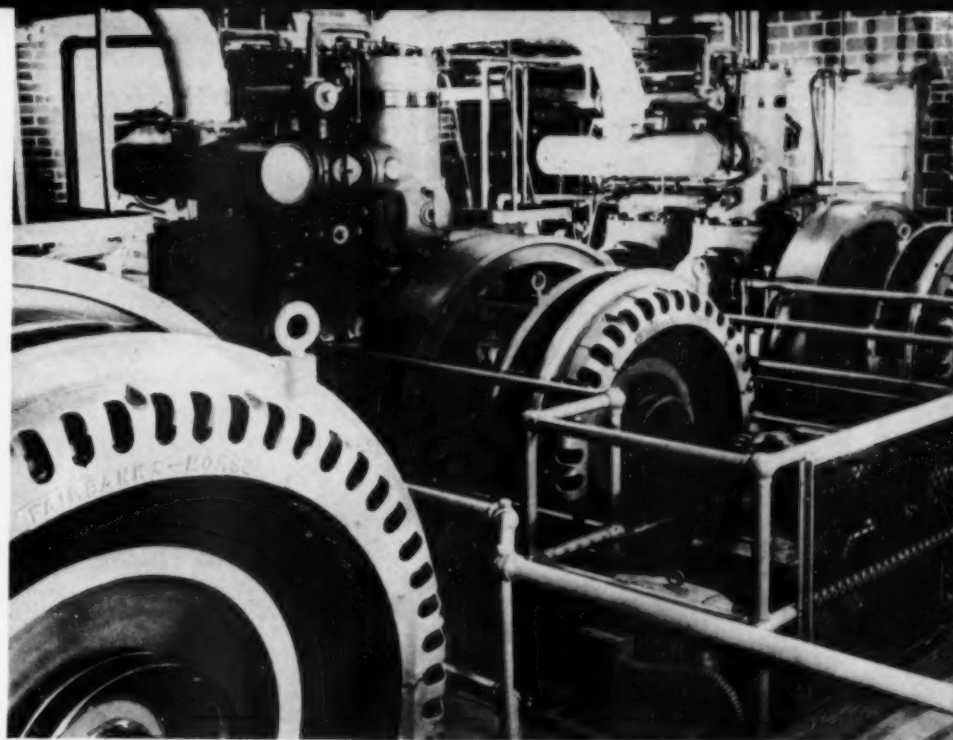
Power: 4.5 cents straight per kwh., with 50 cents per horsepower minimum.

The residential and commercial light schedules replaced the original diesel-period rates, for both, of 9 cents for 25 kwh., 8 cents for 25 and 5 cents for excess. Power rates have been the same from the beginning.

Among consumers on the power rate are three grain elevators, three machine repair shops, and a locker and cold storage plant. Another good-sized customer is an REA cooperative which in 1947-48 used 57,090 kilowatt hours and paid \$1,715.

The village council governs the electric plant. Its members are: Hugo M. Hehnke, chairman; Frank Lammers, Jr., M. W. Powell, Virgil Eakins and H. C. Briggs. Charles E. Cunningham has been superintendent through the diesel period.

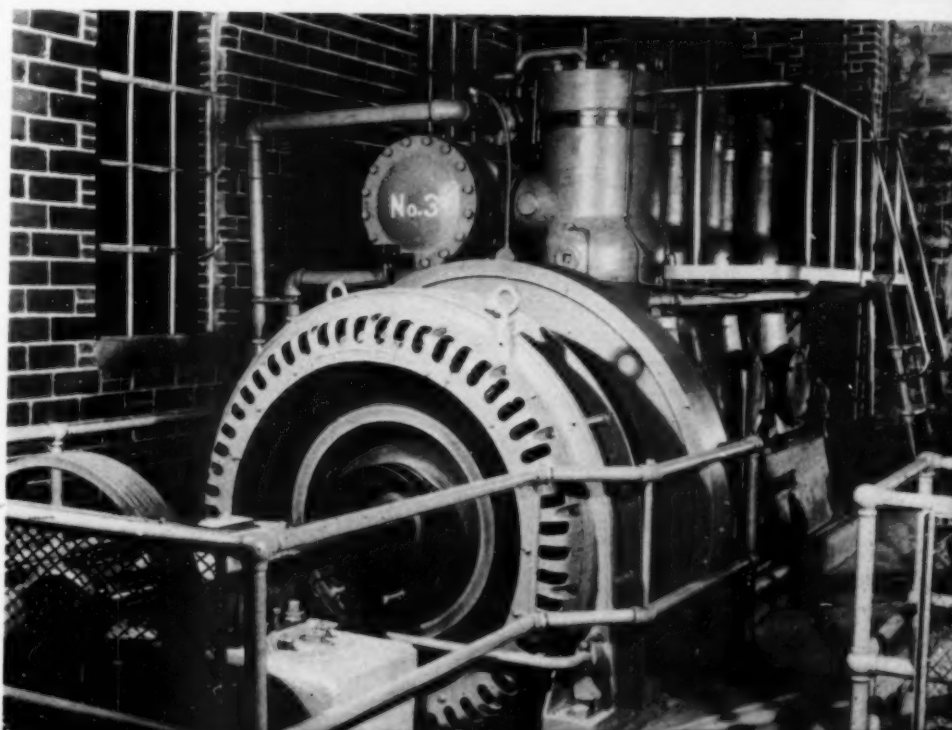
The following auxiliary equipment is found in the Paxton plant: Governors—Woodward; four panel switchboard—General Electric; Two Fairbanks-Morse circulating water pumps; One F-M evaporative cooler and two Young radiators; Three Burgess silencers and air filters; Two F-M air compressors; Three F-M fuel oil pumps; One Buffalo fuel oil meter; Two Alnor pyrometers.



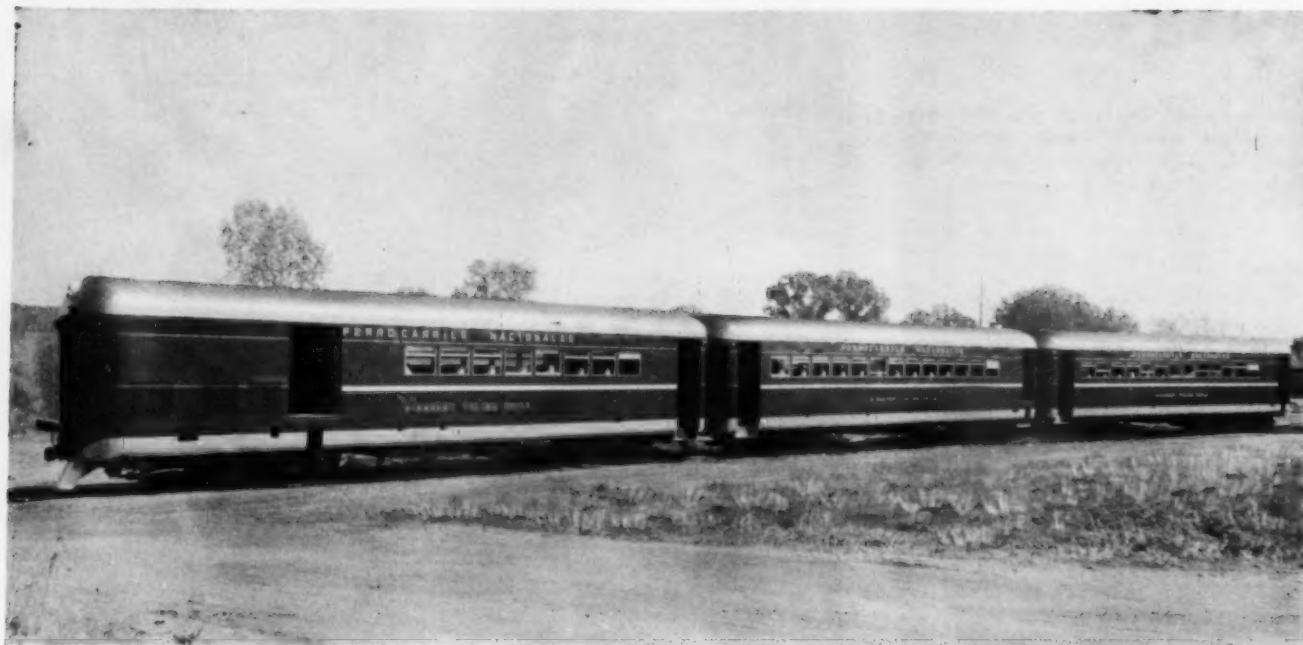
All three F-M diesels, 465 hp., 301.6 kilowatts: In 1947-48 their output averaged 12,549 kilowatt hours per gallon of fuel oil.

Two fuel oil day tanks and one of three fuel oil F-M pumps.

Three cylinder 225 hp. Fairbanks-Morse diesel, latest addition to the Paxton plant.







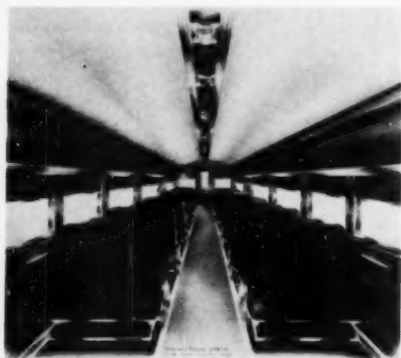
Although designed as a 3-car train each unit is self powered with a Cummins diesel and equipped with controls at one end.

## THREE CAR DIESEL-ELECTRIC TRAIN FOR COLOMBIAN NATIONAL RAILWAYS

By E. W. MAYO JR.

**A**N unusual three car diesel-electric train was recently completed by the Davenport-Besler Corporation for the National Railways of Colombia and was shipped to that country by steamer in the middle of April. The train was designed to operate as a three car unit from Tolima at the

Interiors are roomy, trim and well lighted.



head of navigation on the Magdalena River in Colombia to the capital of that country at Bogota. This involves a climb from the low point on the river at 300 ft. above sea level to the altitude of the capital at 9,300 ft. over a distance of some 60 miles. The right of way involves grades up to 5%. Due to the severe nature of the service for which they are intended, a number of unusual features are incorporated in this modern and efficient diesel-electric train.

The train is designed to operate as a three car unit which can be controlled from either end of the train. Each car has a control station at one end and can be operated as a single unit. The train consists of one combination passenger, buffet, and baggage motor car and two straight passenger motor cars. The passenger buffet baggage car has ten reversible and four stationary seats with a total seating capacity of 28 passengers. Each of the straight passenger cars has seating capacity for 48 passengers, giving the train a total seating capacity of 124 passengers with a sizeable baggage compartment in the first car. Each of the cars is 48 ft. 2 in.

in length and operates on a 36 in. track gauge having a height from rail to roof of 12 ft. The lead, or passenger buffet baggage motor car weighs 71,000 lbs. and the straight passenger cars weigh 56,000 lbs. Considering the power units installed in these cars, this is an extraordinarily light weight for the difficult service intended.

To take the lead car first, this is equipped with a Cummins supercharged 6 cylinder diesel engine, developing 275 hp. at a maximum of 2100 rpm. Cylinders are 5 1/4 in. bore by 6 in. stroke. The engine delivers 220 hp. to the General Electric generator, a 4 pole direct current railway generator, separately excited and directly connected through flexible disc type couplings to the diesel engine. The generators, drawing current from the battery installation, are motored to serve as starters for the diesel engines. An auxiliary exciter generator supplies excitation to the main generator to impart to the main generator constant horsepower characteristics over a wide range of current and voltage. The auxiliary generator operating in conjunction with a regulator supplies fixed voltage



over the full speed range of the engine for battery charging and other auxiliary loads. Current from the generator feeds four G-E railway traction motors, each truck being provided with two axle hung motors.

Each of the passenger cars is provided with one power plant as described above, feeding two motors which are mounted on the leading truck of each car. These trucks are of the fabricated swing bolster type with hydraulic shock absorbers. These are the first such snubbers to be used in Colombia. The wheels themselves are 33 in. in diameter of rolled steel. The axles are forged steel with cast steel journal boxes and Timken taper roller bearings. Air brakes with truck mounted brake cylinders are a feature of the design.

The Colombian National Railway has experienced considerable difficulties, not with the climb of 9,000 ft. net in a matter of 55 miles, but with the descent from Bogota to Tolima. Ordinary air-activated brakes become extremely overheated and upon several tragic occasions in the past, trains have run wild on a down grade causing serious accidents. In view of the history of this railroad considerable effort was made to provide a braking system that would work at all times. The design includes seven stage dynamic braking, operating on a range of 16 to 50 miles per hour, on each car. In this arrangement each of the seven stages of acceleration on the uphill climb can be changed by simply pressing a control button into seven stages of braking through the motor and without use of the Westinghouse air brakes with which each car is provided. By setting the motor brakes at any one of the seven stages between 50 and 16 miles per hour, braking is applied by the drag of the drive motors. Current so generated is dissipated as heat through a series of air-cooled resistors provided on each car.

Another unusual feature in the design is the off-center position of the engines. Instead of their being centered in the car, the engines in each case are placed off to one side of the car. Gears are mounted on the main axle and are driven from the pinion on the motor shaft.

In addition to the motor braking or dynamic

braking described above, each of the cars is equipped with Westinghouse air brakes, schedule "SME" straight air equipment with automatic emergency safety control. These brakes are necessary to bring the train from its lowest stage of dynamic braking—16 miles per hour—to a dead stop and may also be used in emergency checking of the forward motion of the train at particularly bad features of the right of way.

Each power unit is supplied with fuel from a 300 gallon tank mounted under the frame with an electrically driven fuel pump supplying fuel to the engines. A 150 gallon water tank is mounted under the car and supplies water for passenger use. Cooling of the engines is achieved by a roof mounted radiator with water capacity of 29 gallons in the engine and radiator. Two 24 in. diameter fans operating at engine speed supply air for cooling the radiators in a sectional core of the roof.

The exhaust from these fans may be used to heat the car on the savanna as the train approaches Bogota where the climatic conditions are such as to require occasional heating of the cars. It should be noted that the generators and engines can easily be removed from the front end of the car by unbolting a section of the front end. The balance of the body is of welded aluminum construction.

The under frame and superstructure of the car bodies are of rolled and formed steel sections. The roof and side sheets are of stretched leveled steel. The body is of all welded construction with panels of seven ply "Plymetl," a special siding consisting of laminated wood covered on both sides by aluminum. The flooring is covered with a simple but striking design in battleship linoleum. The side and roof sheets are coated with "Ded-nox" to reduce sound conductivity. Fibreglas insulation is

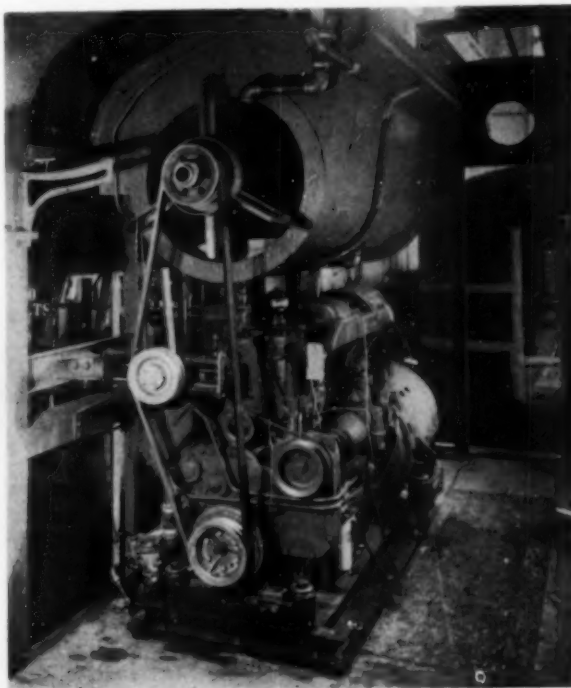
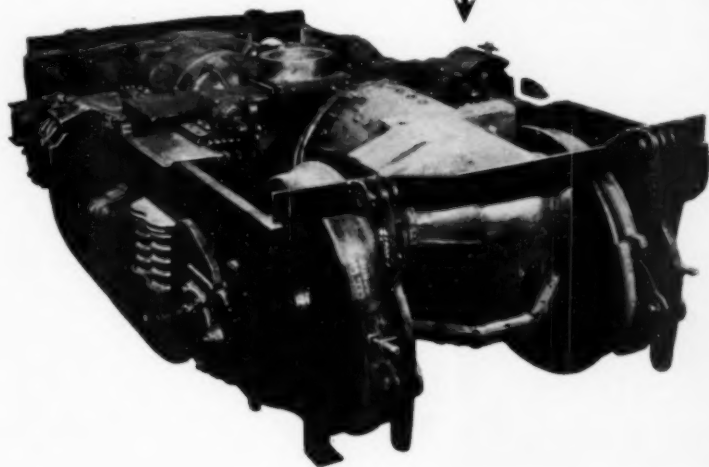
provided between posts which are in turn covered with 1/4 in. Masonite. Windows are of aluminum with a single raising sash glazed with 3/16 in. laminated safety glass. Window curtains are provided with aluminum coating to reduce heat absorption in the valley. Individual lights are provided over each seat and are located in the luggage rack. Fans and mirrors are provided at each end of the car. In the lead car facilities are provided for cooling refreshments and a small bottle-gas-operated stove is provided for hot meals.

Four features of this equipment are of particular interest. First, the necessity for extreme power in relation to the weight of the equipment is required for the severe climb of the right of way. In addition it has been necessary to make the equipment as compact as possible and to this end most of it is located under the flooring of the cars. A third feature of interest is the unusual arrangement of the dynamic braking in addition to the Westinghouse air brakes. Finally the insulation, "Ded-nox" coating and the Fibreglas insulation reduce the sound of the engines to an absolute minimum and provide protection against the heat to be found at the lower stretches of the right of way. The cars are attractively painted in the Colombian colors and are provided with aluminum coated tops to reduce heat absorption.

It is anticipated that successful operation of this unusual but highly efficient train will add to the service of the Colombian National Railways on the important run from the head of navigation at Tolima to the capital of the country. Mr. George Besler, Chairman of the Board of the Davenport-Besler Corporation, who designed and constructed the train is expected to visit Colombia for the inauguration of this new train, with engineers of the Davenport-Besler Corporation.

Power unit, mounted off-center is a 275 hp. Cummins diesel and G.E. generator. Fans supply air to engine cooling radiator in the roof.

Leading truck in each unit carries traction motors and is equipped with hydraulic shock absorbers.





# TORQUE CONVERTER FOR DIESELS

**T**HE hydraulic torque converter is based on a principle of dynamics that was first brought to light in 1905 by a German named Föttinger. In subsequent years the idea went through various stages of development and has been extensively employed in the automotive industry, first in the heavier vehicles such as buses and trucks and large crawler tractors; more recently it has been adapted

to passenger cars. Numerous applications have been made in logging machinery on the West Coast, and it is being widely used in oil well machinery.

A hydraulic torque converter is made up of three principal parts which are called the converter pump, the converter turbine and the reaction

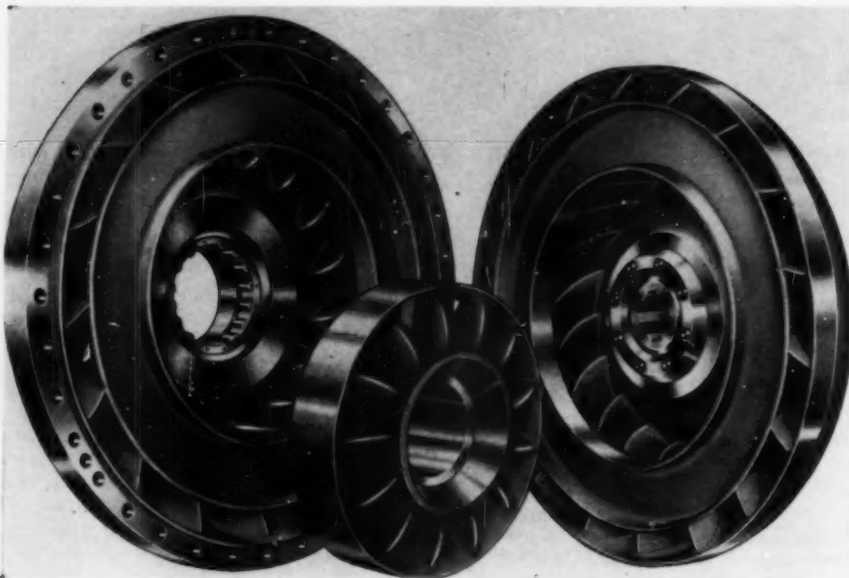
member, which are single-piece aluminum castings comprising vanes or blades that direct the flow of the moving fluid—in this case an oil having certain flow and viscosity characteristics. When these parts are assembled in a unit, power from the engine is transmitted from the flywheel through a gear-type coupling to an input shaft, and thence through the cover of the pump to the converter pump. The reaction member is mounted between the converter pump and the turbine, which is mounted opposite the converter pump. The turbine is attached to the output shaft by means of a splined hub. The reaction member receives the oil after it leaves the turbine and redirects it to the pump.

The converter is filled with oil at all times. This oil is picked up by the pump blades, which are rotating at engine speed, and is forced outward and forward. This action corresponds very closely to the action of any centrifugal pump. The fluid enters the center and is discharged at the outside.

The oil leaving the pump enters the turbine, and its direction is reversed by the turbine blades. This then absorbs the power from the oil and transmits it through the turbine hub into the output shaft. This action is very similar to that which occurs in a water turbine, where the jet of water is reversed in direction and the power absorbed from it.

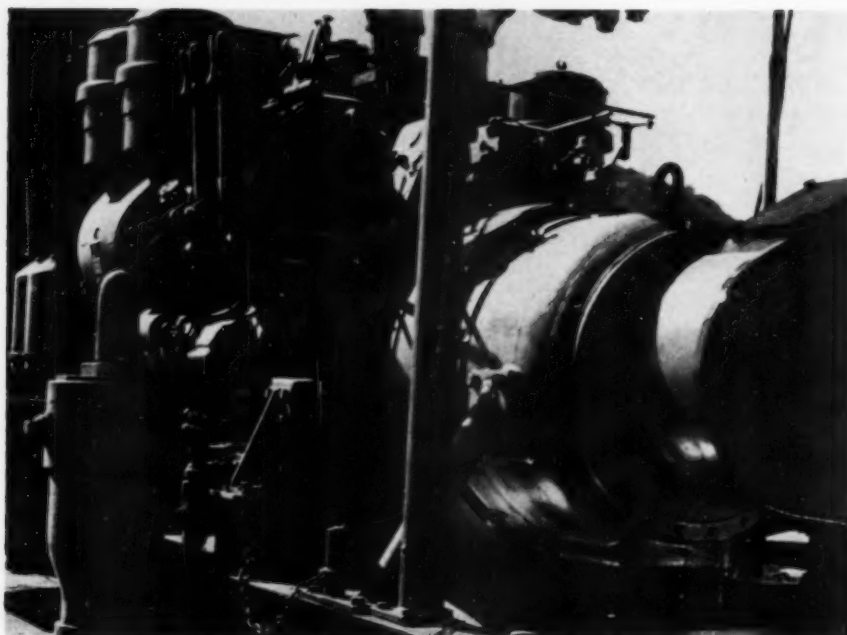
After leaving the turbine, the oil enters the stationary reaction member, and its direction is again reversed so that it may again enter the pump blades. This is true only while acting as a hydraulic torque converter. Whenever the output shaft is operating at approximately 85 percent of the engine speed or more, the oil leaving the turbine will strike the reaction member blades on the backside. At this time the free wheel unit will unlock and make the reaction member inoperative. The unit then acts as a hydraulic coupling with only the pump and the turbine transmitting power.

The unit is designed to function both as a hydraulic torque converter and as a hydraulic coupling. The function of the reaction member is to supply torque and get the transmission of power started. When the transmission of power has reached a point where no further increase of torque is desired, the converter range ends and the coupling range takes over. The reaction member is so arranged that it becomes inoperative during the coupling phase; this effect is attained by mounting the reaction member on a stationary sleeve by means of a freewheeling unit. This permits rotation of the reaction member during the coupling range and prevents rotation during the torque converter range. Whether or not the reaction member rotates depends upon the direction from which the oil leaving the turbine impinges against its blades.

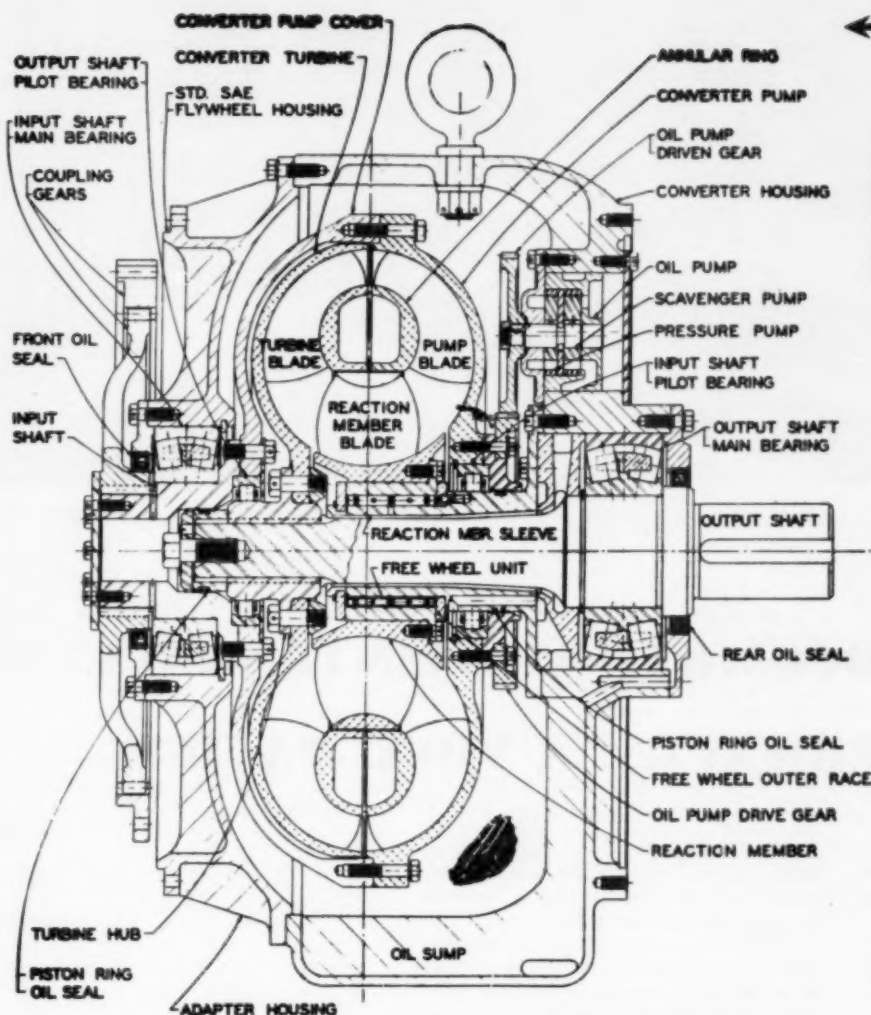


"TORCON" Hydraulic Wheels—Pump, Reaction Member and Turbine.

Torque Converters in the Oil Fields.  
"TORCON" unit mounted on General Motors Twin Diesels driving Slush Pump.





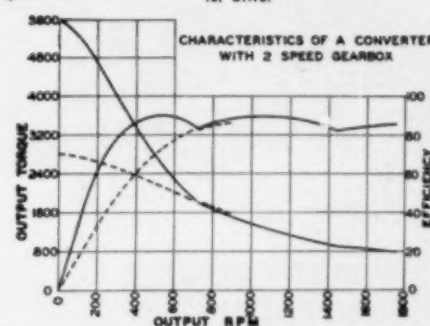


In addition to the main functional parts, the unit is equipped with an oil pump system comprising two pumps in one housing. The forward or pressure pump draws oil from an oil tank and forces the oil through the inlet passage into the converter proper. This oil also serves to lubricate the bearings. After circulating through the converter, the oil goes through an outlet passage to a pressure relief valve and then through a heat exchanger back to the oil tank. The above description applies to the "Torcon" unit built by the Torcon Corporation.

The dominant feature of a hydraulic torque converter is that transition from the converter range to the coupling range is effected automatically by the characteristics of the unit, no outside controls being required. This combination makes it possible to operate at high efficiencies over a wide speed range and to obtain high output-shaft speeds, permitting full utilization of the engine horsepower throughout the entire range of part-throttle to full-throttle operations. During the converter range the engine performs at a practically constant speed, making it impossible to stall the engine due to overload. After passing into the coupling range, the engine speed increases in nearly direct proportion to the output speed. The efficiency is

comparatively high over a wide speed range, attaining 70 percent at 400 rpm output speed and remaining above this value for the balance of

← Cross-Section of a Torcon Corporation, Torque Converter Drive.

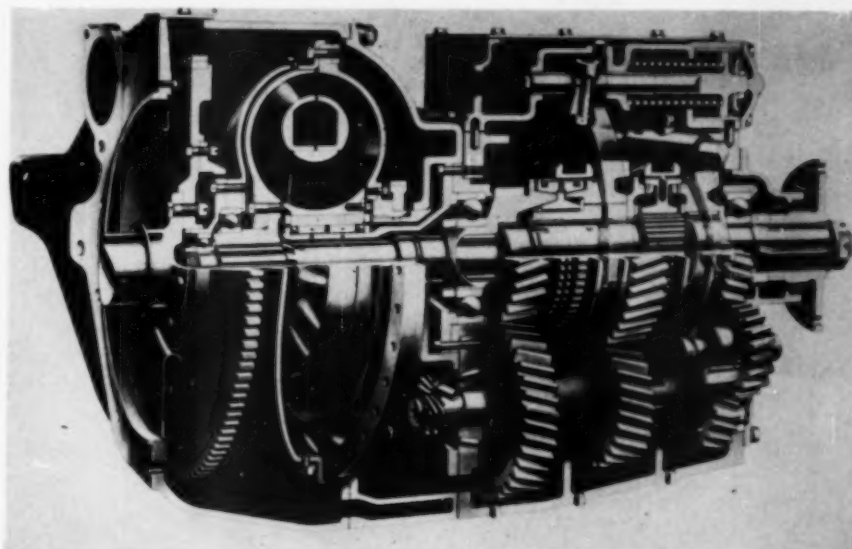


the speed range at full throttle. This is due to the combined functional advantages of the torque converter and coupling. For instance, at half throttle the converter range is reduced and the coupling range is correspondingly increased. This extends the higher efficiencies over an even wider speed range. Operation above 270 rpm will now be at efficiencies higher than 70 percent. Other part-throttle settings show comparable efficiencies.

These characteristics make the unit an ideal automatic transmission for such equipment as logging machinery, oil well machinery, locomotives, power shovels and road machinery. It allows of infinitely variable speed and torque ratios and automatic selection of the most effective torque multiplication. The engine cannot be overloaded or stalled, and the mechanism is simple enough to be serviced by the average mechanic.

This feature is of particular value in the normal operations of rotary drilling, where speed can be kept constant even with considerable variation of load, and where, when required, torque can be multiplied up to three to one without twisting off the pipe.

Photographic Cross-Section of White Motors, Hydrotorque Drive.







Union Pacific, Los Angeles, Diesel Locomotive, Repair and Overhaul Shop showing servicing pits in the foreground. An Alco 2000-hp unit and two Electro-Motive 2000-hp units can be seen on the tracks.

## DIESEL LOCOMOTIVE MAINTENANCE AND OVERHAUL... UNION PACIFIC

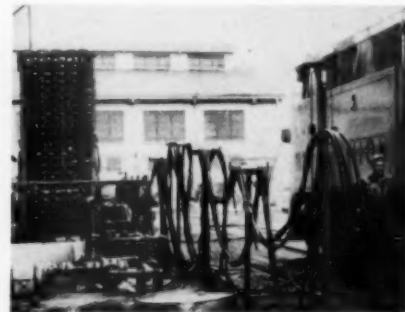
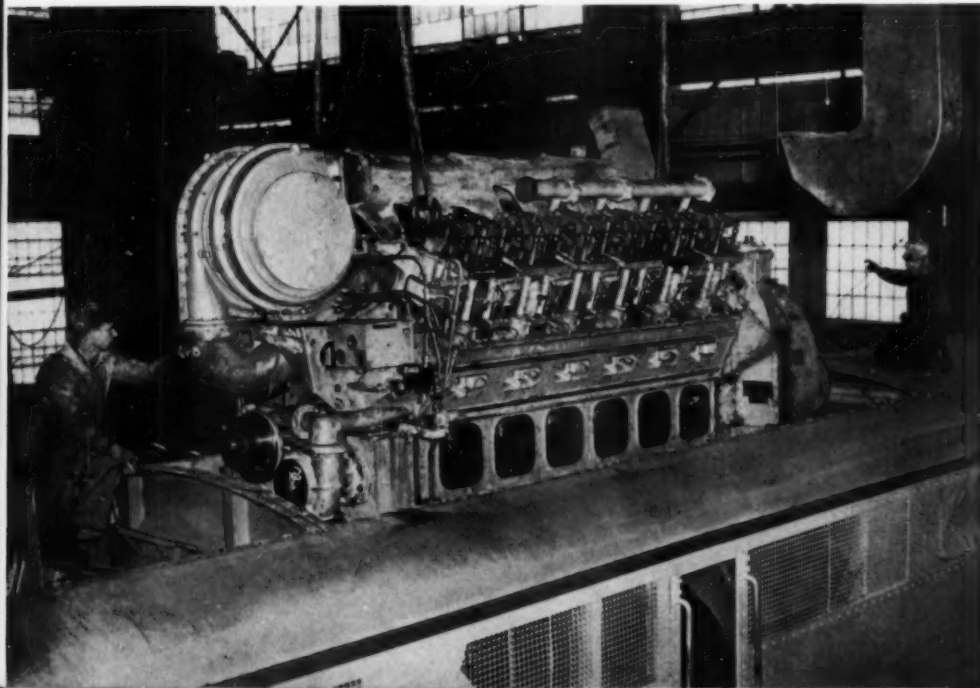
By FRED M. BURT

**A**T the 20 stall roundhouse in the Union Pacific yards in Los Angeles, where in years not long gone by, there were many huge steam locomotives, today there is but one. It is a mountain type locomotive, usable for both passenger and freight service, kept ready for quick use, but only as a standby.

Which is by way of saying that the entire Cali-

fornia Division of the Union Pacific Railroad running east to Salt Lake City, is fully dieselized—for switching, freight and passenger service. The roundhouse is now used for freight diesel locomotive trip servicing and repair work. Here also all of the diesels are fueled and lubed. In a typical recent month, 754,000 gallons of diesel fuel oil and 27,317 gallons of lubricating oil were fed into locomotive tanks.

The U.P. streamliner "City of Los Angeles" arrives in the Los Angeles Union Terminal each morning at nine o'clock. After unloading, the train makes a short run to the shops for complete inspection and servicing that it might be in prime condition in all respects to leave the station at 5 P.M. for another 4600 mile Chicago round-trip. The running time of the Union Pacific diesel streamliner is 39¾ hours each way.



Load-Testing Freight Diesel Locomotive. Note pipe coils of Water Rheostat in background.

Fifteen ton, Alco diesel being replaced in car after overhaul.



Four of these 13 car, 1100-ft. long trains maintain the full schedule of a departure from each terminus every morning. A fifth power unit serves as a standby, making a total of five sets of three EMD (Electro-Motive Division of General Motors) 2000-hp. diesel locomotives to supply tractive power for the "City of Los Angeles." With governors set at 102-mph., they cruise along with seeming effortlessness at 80-85-mph.

In the time of less than seven hours that the train is at the shops, it is given an extremely thorough going over. The train first moves slowly (in about 30 minutes) through a large washing machine in which large, vertical, revolving brushes wash the sides of the train, followed by a rinsing. Every moving part of every car is thoroughly checked, with repairs or replacements when indicated. Interiors are cleaned, new bedding and all other supplies, including food and drink, are added to the train.

In the meantime the diesel locomotives move on up to the "back shop" pits which are equipped with pipe lines for plain and treated water, steam, air, oxygen and acetylene. All passenger engine trip-servicing is done here, also major diesel overhauls for both freight and passenger units. The trip-servicing calls for a complete engine inspection—electrical equipment, air brakes, transmission controls, steam generator, power units; running inspection of air box and crankcase with covers off. Just before leaving the shops there is a transition check, that is, the response of each engine and then all engines, to each throttle notch control in the head or "A" locomotive unit.

Pulling out at 5 P.M., the first fueling is at Los Vegas, then at Ogden, Cheyenne, and Omaha, with another trip-servicing during the eight hours the train is in Chicago.

The Los Angeles shops handle the largest volume of diesel overhaul of any shop in the entire Union Pacific system. Assigned here for overhaul at this writing are 53 passenger units—26 EMD's of 1500, 1800 and 2000-hp.; 13 Fairbanks-Morse of 2000-hp.; and 14 Alco's, also 2000-hp. In addition there are 124 EMD freight units of 1500-hp, 88 1800-hp. Alco's, and 23 EMD switchers of 1000-hp.

Other passenger trains serviced include the "Los Angeles Limited" (to Chicago), and the "Pony Express" (to Denver), each powered with three 2000-hp. Alco diesels. All of this adds up to a huge amount of servicing, repair, and overhaul work under the supervision of Terminal Master Mechanic John H. Sinner, with L. C. "Bud" Fisher as Diesel Foreman. Master Mechanic R. F. Weiss has charge of the whole Western Division.

Freight diesels are given a trip servicing at the end of each run. At the 20,000 mile mark comes complete inspections and running repairs. At 80,000 there is another inspection followed by more thorough repair and parts replacement. Then after 250,000 miles of service comes the major overhaul, the general processes of which are major subject of this article.

To illustrate this in some detail, let us follow

what happens to a freight locomotive. The diesel car is run in on one of the parallel tracks in the larger bay of the 193½' x 254' diesel shop. This bay is served by two 40' lift, 82' span cranes of 20 and 200 tons lifting capacity. The latter has four special hooks previously used to lift whole steam locomotives, now lifting diesel cars off their trucks. Other hooks lift diesel engines and other units of the locomotive.

The heavy diesel engine is lifted out through the removable roof of the car and carried down to the pit where while still suspended, it is completely coated with Oakite No. 9 cleaning solution applied with a hand pump spray gun. After soaking for 10-15 minutes it is hosed off with a hot spray produced by injecting steam at about 100-psi. into a water line. Then the engine is lowered into the next bay where a 30 ton, 25' lift, 70' span crane carries it to one of the overhaul work stations where it is placed on heavy steel stanchions. Other handling is done with 10 ton jib cranes carrying 3000-lb. Chicago Pneumatic air hoists, and a gas-powered floor crane which can move to any point desired.

Then the tear-down starts. A torque wrench is used to remove rocker arms and cylinder hold-down mounts. The cylinder heads are removed, also the exhaust manifold, supercharger, main electric generator, and other accessory parts. With removal of engine block and crankcase (which are in a special, revolvable frame for work to be done), the engine is stripped down to its base.

All of the various engine sub-assemblies and other component parts go to the shop sections devoted to specialized phases of overhaul and replacement of any defective units. To the electrical department, to magnaluxing where cracks and other hidden defects are detected, to grinding of seats and valves. Injectors and pumps are renovated and tested at another point. In other words, every single part gets the works that it may be restored to prime condition.

After arriving at the 100 per cent "down" condition, the build-up starts immediately. Liners are applied to pistons and then both are placed in the engine block. At the point of 50 per cent re-assembly the crankshaft has been applied to the engine block and the super-charger has been mounted along with other units.

When the overhaul and subsequent assembly is complete, the crane picks up the heavy load and reverses the travel back to the transfer car, to the other crane, then is lowered into the car. The elapsed time from removal to replacement in car was 40 hours.

The shop operates 24 hours a day, seven days a week that the restoration of power units to service in prime condition never lags a minute. The operation is like that in a well equipped and organized manufacturing plant in continuous production flow, rebuilding top efficiency into diesel engines.

The personnel of both shops for all shifts includes 18 foremen, 151 machinists, 16 machinist apprentices, 31 pipe-fitters, 8 pipe-fitter appren-

tices, 45 electricians, 12 boiler makers, 29 engine wipers and cleaners, and 9 laborers.

After the diesel engine is replaced in the car, the unit is replaced on the nearby load-testing track. The engine is direct-connected to the main generator, and this in turn supplies current to four traction motors which are geared to the wheels of the car. In this load-testing the power lines from generator to motors are disconnected and hooked up to a water rheostat. This provides the necessary resistance to indicate the horsepower developed during the course of the eight hours power test run.

After nearly an hour's idling run for various inspections and checks the engine is run for one hour at each of the throttle notch settings, from 350 rpm. to 1000-rpm., and is expected to register successively the following horsepower readings—55, 175, 295, 540, 765, 940, 1215, and 1530 (at full throttle). These horsepower are calculated from readings taken from the meters registering voltage and amperage kept under constant observation during the test run.

Thus the overhauled diesel is called upon to demonstrate that it is fully in shape to do what it is expected to do when it gets back out on the road with a heavy load. This is just a good example of the many comparable, standard Union Pacific practices in the maintenance of rolling equipment, that help to take the guesswork out of railroading.

The great advantage of diesel-electric locomotives is their "availability." It is only by maintaining locomotives in first class condition that this advantage is not lost. The Union Pacific leaves nothing to chance in their systematic servicing system. Continuous surveillance and the all-important routine servicing are the only means of obviating troubles. Union Pacific Railroad's "production line" methods work smoothly and easily and keep the giant locomotives rolling.

Removing Pistons and Liners from 2000-hp. Electro-Motive, Freight Diesel using ten ton jib crane and Chicago Pneumatic Air Hoist.







The new 525 hp. Rathbun-Jones diesel engine at the Watchtower plant, directly connected to a 350 kw. Elliott generator.

Two 170 hp. Ingersoll-Rand diesels connected to 120 kw. G-E generators that have been carrying the load before the installation of the Rathbun-Jones engine.



## Diesel Driven Printing Plant

By ALFRED A. DECICCO

**A**N interesting example of a diesel generating plant has been operating for the last 22 years in the Watchtower Bible and Tract Society, Inc., of Brooklyn, New York. With the recent installation of a new 525 hp. Rathbun-Jones diesel engine, the entire printing plant is rendered independent of any outside source of power.

The Society is operated entirely without profit to its sponsors and members, who have volunteered their services. In return they receive a nominal monthly salary of \$10 and are housed by the Society in a dormitory which is situated a few blocks from the plant. The output of the Society is approximately 20,000 bound Bible text books per day, in addition to two semi-monthly magazines which are printed and mailed at the rate of 2,500,000 per month. The Bibles and Tracts are printed in 65 different languages at the Brooklyn plant; 91 languages by the world-wide organization, hence facilitating international Bible education.

It is not surprising that in such a printing plant diesel engines are selected for the sole source of power. In this connection estimates were prepared, analyzing the costs of various forms of power, based on the operation of the plant as a regular commercial press, paying the usual wage scale of such organizations. The choice of diesels

by the Society was therefore made on a cost basis which they found would be the most economical.

The new Rathbun-Jones diesel is rated at 525 hp. at 300 rpm. with a bore of 13½ inches and a stroke of 22 inches. It is directly connected to an Elliott generator with a kw. rating of 350. The engine is air started and is fitted with a Woodward governor. Prior to the installation of the Rathbun-Jones engine, two 170 hp. Ingersoll Rand diesel engines with G.E. 120 kw. generators had been carrying the load for 22 years. For engine cooling water circulation a Davidson centrifugal pump, driven by a Star motor is used on the two Ingersoll-Rand engines. On the Rathbun-Jones, an Alcan-Murray pump is used. The Davidson pump is designed for a hundred foot head and has a capacity of 70 gallons per minute at 1850 rpm. The cooling water system is arranged so that the operator can circulate city water through the cooling jackets to waste, or can recirculate the water through a Niagara Heat Exchanger, using city water for the make-up. All of the valves controlling the water circulation are located in the engine room.

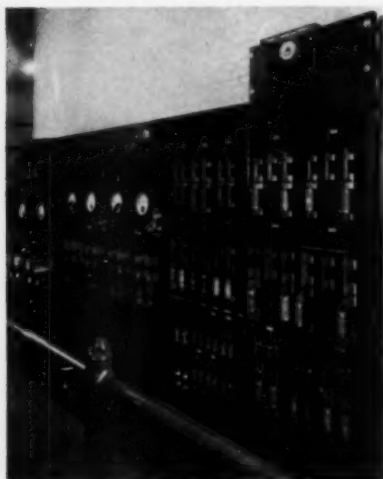
An additional factor of safety is achieved in this system by the provision of a Brown recording instrument which indicates the level of water in the roof tank on a chart in the engine room. A

change of one foot in the water level of the 1500 gallon tank will cause an alarm bell to ring, warning the operator of an impending shortage in his water supply. Richardson-Phoenix Flow Indicators are fitted to the cooling water outlet of each engine and these have a Bowser electric alarm bell to ring if the water supply fails. Motoco Dial Thermometers reading up to 212 degrees Fahrenheit are located in the water inlet and outlet connections of each engine.

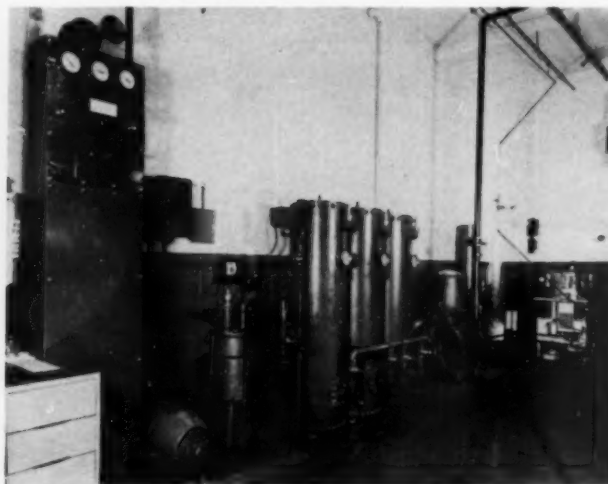
Installed outside of the building is a 12,000 gallon fuel oil tank. Located near this tank inside the building, is a motor-driven Blackmer fuel oil transfer pump which delivers fuel oil from the main storage tank through a pipe fitted with a Tate-Jones single pass oil filter, to a 200 gallon day tank which is located beneath the engine room floor. Another Brown recording instrument is used to show the quantity of oil in the main storage tank. A Hilco lube oil reclaimer is used for the Rathbun-Jones diesel and another for the two twenty-two Ingersoll-Rand diesel engines.

Because of the building layout it was found advisable to lead exhaust from the three engines into a common header, and connect this header to a Maxim Silencer on the roof. Temperature of exhaust gases is indicated by an Alnor exhaust pyrometer, on the Rathbun-Jones engine. The switchboard and instruments are G.E.

General-Electric switchboard and instruments giving the printing plant dependable service since its original installation.



From left to right: Alnor pyrometer and alarm system, G-E motor driving three Ingersoll-Rand air compressors. Far right is a Hilco oil reclaimer.



The cooling water system is arranged so that water can be recirculated through this Niagara heat exchanger. Lower right is another Hilco oil reclaimer.





# TUNA CLIPPER "VIRGINIA R"

By CHARLES F. A. MANN

**L**AST of the 1948 Tacoma-built tuna clipper fleet, the husky 108 foot diesel tuna clipper *Virginia R.* is obviously destined to create endless talk in the southern tuna fleet as her unusual power plant is discussed and her performance closely observed. Carrying a compact, vibrationless General Motors 2-cycle power plant, a big main and two auxiliaries, the *Virginia R.*'s power is unique in that it is probably the most underrated diesel installation ever made on the Pacific Coast.

The main G.M. diesel is a 16-cylinder unit, with the governor set down to a maximum of 550 rpm. at full throttle. At top speed, these diesels in locomotive and marine service are rated at anywhere from 1200 to 1600 hp. so as to the exact output of the unit at the low top speed of 550 rpm. is anybody's guess. The main engine drives a 64 x 34 inch three bladed Coolidge propeller, and a Falk reverse gear is fitted for speed maneuvering. The propeller, however, is direct drive, via a 6 inch Monel Metal driveshaft. The ship therefore has an enormous reserve of power, and the low loading on the main engine is expected to give it extra long life and freedom from trouble. Burgess exhaust silencer and Alaskan Copper Works heat

exchanger for fresh water cooling are fitted to this diesel. A Goodrich cutless rubber stern bearing is provided also.

Auxiliary power is provided by a pair of identical 3 cylinder G.M. diesels, each turning 100 kw. Delco generators, delivering current at 440 volts A.C., 3 phase. Transformers for small motors and ships lighting are provided. These units carry Harrison heat exchangers. This flexible, efficient electric system permits quick shoreside connections and shutting down auxiliary power in port yet keeping the refrigeration and lighting circuits energized for long sessions at merely keeping the cargo in frozen condition.

The vessel is of the usual heavy Douglas fir construction, with plywood used in deskhouses and for certain bulkheading and subflooring. The trim, modern appearance, square, low stern and use of all steel fish tanks and bait boxes, lightweight compact pumping layout in the shaft alley and other features make the *Virginia R.* one of the years outstanding clippers.

The vessel is 108 ft. 6 in. x 27 ft. 3 in. x 14 ft. 1 in.

overall, and will carry approximately 220 tons of frozen tuna. She carries a total of 26,000 gallons of diesel fuel on the outbound voyage (with some of the fish tanks filled with oil); 1500 gallons of lube oil and 4600 gallons of fresh water.

Crew's quarters for 15, with master's quarters adjoining the pilot house chart room; complete deep-sea navigation instrumentation and large, well-equipped galley make her a pleasant ship to work on. Sperry electro-mechanical steering gear; Northern anchor winch with 7½ hp. Master gear motor, from the Tacoma Boatbuilding Co.'s own Northern Line of auxiliary equipment; Submarine Signal Co.'s fathometer; and Intervox direction finder; Northern radio and Delco fresh and salt water systems are some of the featured equipment.

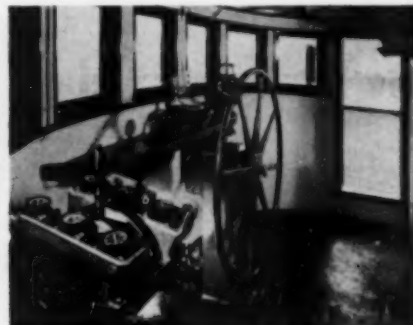
Refrigeration is supplied by three 5½ x 5½ Howe ammonia compressors, each powered by 25 hp. Master motors. A 7½ hp. condenser pump; a pair of 12 inch propeller type Fairbanks-Morse bait pumps; twelve 2 hp. brine circulating pumps and two 5 hp. Fairbanks-Morse pumps, one fire and bilge and the other standby, complete the pump layout.



Last of the 1948 Tacoma-built tuna clipper fleet.



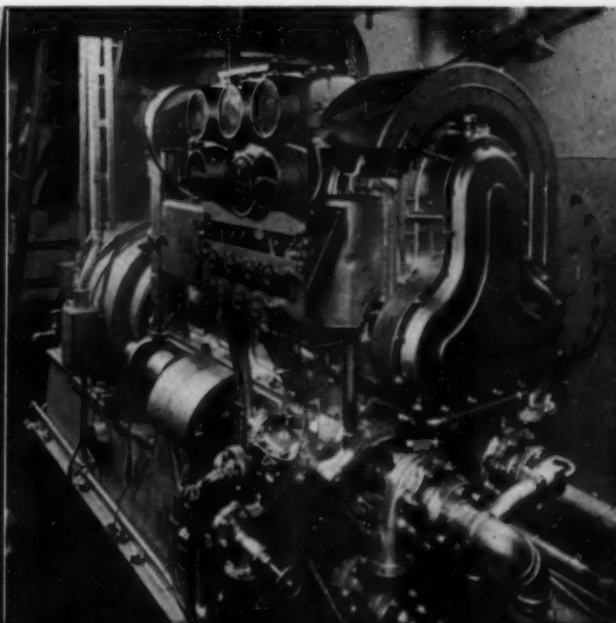
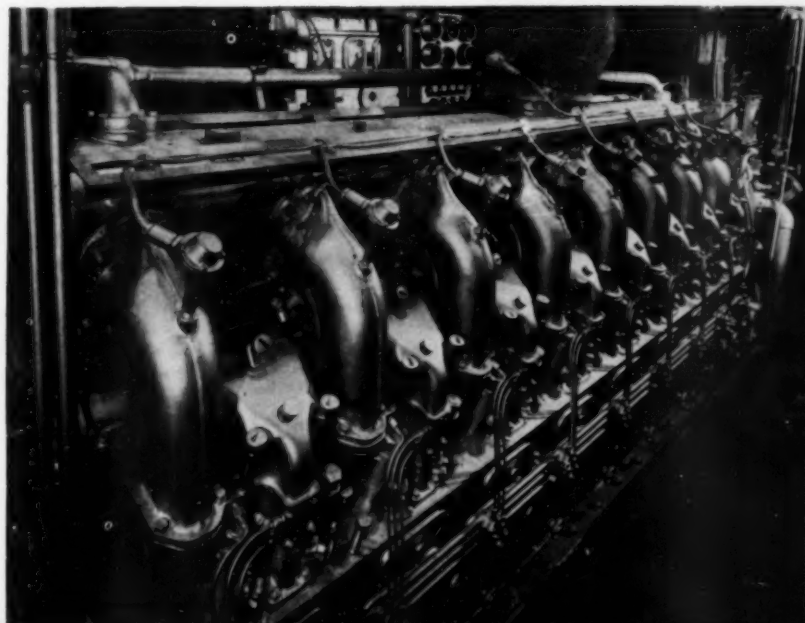
View of the shaft alley on the *Virginia R.*



Pilot house and pilot house controls for the main diesel.

General Motors 16-cylinder diesel engine rated at 1200 hp. at 550 rpm.

(Below) One of the 3-cylinder General Motors auxiliary diesels.





## SNOWBOUND LIMITED

## VIA DIESELS!



Diesel bulldozer-tractor hauls stalled truckload of feed for "4-B Ranch" of Alcove, Wyoming.



(Above) International diesel crawler bulldozer breaks way through drifts for herd near Alliance, Neb. (Below) Hungry Herefords on Nebraska ranch get to haystacks again thanks to diesel driven bulldozer.



**Rugdest Winter in 70 Years  
Proved Ranch-Owned Diesel Trac-  
tors Were Blizzard-Busters That  
Saved Millions of Dollars Worth of  
Cattle and Sheep as Well as Humans**

By F. HAL HIGGINS

**T**HE diesel crawler tractor has just demonstrated to ranchers, townfolk and Governmental agencies that it is a blizzard-buster that makes it an essential piece of ranch and road equipment throughout 16 western states which have just passed through their roughest winter in some 70 years. Never was such a sales lesson taught by Ma Nature to so many in such a wide area in so short a time. Those who had diesel crawlers broke their snow bonds as soon as each storm passed, bulldozing a path from cattle and sheep to feed and water before the live stock began to suffer and die. Then they broke out the roads to the schools, churches and hospitals. But those ranchers who did not have these tractors with the diesel hearts, crawler treads and bulldozers on the noses were buried by Nature's ghostly blankets until Government emergency services from air and ground could be organized, mobilized and brought to the suffering areas. There were just too many farms, ranches, small towns and city demands for this belated emergency service to do enough in time to save thousands of head of live stock, some lives and much time. Ordinarily the inter-mountain ranch areas get one or two big snows with at least one in the blizzard class. But last winter, there was blizzard after blizzard, many great stretches of this important cattle and sheep range getting five of them, one on top of the last before the first one was broken out.

The winter of 1948-49 in the west will probably go down as the worst in the nation's recorded history, the U. S. weather bureau revealed.

The writer, who knows most of the farm paper editors of this area from Lincoln, Nebraska, to Spokane and San Francisco, asked several of them about this 1948-49 winter and the place of the diesel tractor in saving the live stock where such



equipment was on the ranches. Also, he asked the cooperation of the crawler tractor builders in surveying their dealers to find what their products did in this battle against Nature to save the rancher's flocks and herds. Editor W. P. Wing of the California Wool Grower from week to week ran reports from all sections of the range, summing up with this:

"Blizzard Losses: First Official Survey Shows 97,000 Sheep and Lambs, 81,000 Cattle, Killed—Approximately 81,000 cattle and calves and 97,000 sheep and lambs had perished up to February 1 as a result of severe snowstorms and blizzards in affected areas of 4 states—South Dakota, Nebraska, Wyoming, and Colorado, the Bureau of Agricultural Economics announced."

The Nebraska Cattleman rounded up this report in its March issue:

"The Blizzard of '49 will long be remembered as the worst storm to hit Nebraska. Many people have called this blizzard the state's greatest catastrophe. Seldom, if ever, has such a storm played such havoc with the economy of a great livestock producing state."

"The Association was calling for speed and more speed when President Truman directed the army to take over and to send 'all out' aid to the disaster area. General Pick was placed in command to head the Fifth army operations and 'Disaster Operations Snowbound' became a reality."

"Immediately an army of bulldozer equipment, operators, truck drivers and mechanics began moving into the snow-blocked cattle country of Nebraska to assist in every way possible to avert a calamity from reaching tragic proportions."

"Operations Snowbound has moved ahead rapidly and hundreds of miles of roads and trails were opened, including trails to haystacks and trails for moving cattle, making it possible to provide thousands of cattle with feed. Ranchers have been guiding the tractor operators to the area where the cattle are and then the crew opens paths for the cattle and to the sources of feed."

Supplementing the above, the writer has this editor-rancher eye-witness report from Glenn Buck, General Manager of the Nebraska Farmer:

"I apologize for the considerable delay in answering your letter of March 12. It arrived while I was on a trip to our Rolling Stone ranch in the Nebraska Sandhills region. The picture you requested is one I took on our own ranch during 'Operations Snowbound.' I am sending a print of it, along with several other prints of pictures made while the equipment furnished by the Army was working at our Rolling Stone ranch, Wood Lake, Nebraska."

"Our nearest neighbor to the south purchased a \$10,000 International diesel tractor and bulldozer during the blizzard. Others in the community are talking seriously about buying similar equipment to have on hand for use in the future winters. Generally, they will buy their tractors and bull-

dozers on the basis of one outfit for two or three ranchers. Right now is the time when tractor manufacturers should be offering their equipment. As time goes by, this interest will cool off and it will be much harder to make a sale."

"I should explain that it is the custom in our ranch country to move haystacks in the fall. The hay is stacked where it is cut—throughout the meadows. After haying is over—about the middle of August—commercial hay movers come through with large track-laying diesel tractors and we generally pay about \$10.00 an hour to them for skidding the stacks out of the meadows. The stacks are moved by a log made of bridge plank being placed back of the stack with a couple of men standing on it while the tractor starts out. The entire stack is pulled right across the meadow. The stacks are grouped off at one side and a fence is thrown around them so that the meadow can be pastured. That is common practice."

"The talk I get when I am at the ranch is that several neighbors will get together to buy a track-laying tractor and dozer and, over a period of years, will pay for a good part of it through this stack moving—which they will do in the future instead of hiring it done. The big point, of course, is that they will have this kind of equipment on hand in case of snow storms."

"We didn't lose an animal on our ranch. We were lucky and also we had an excellent foreman in charge. However, in our neighborhood ranchers lost up to 150 head. As we analyze the storms and what might have been done to prevent losses, we always come back to one thing and that is a track-laying tractor with bulldozer. You will understand that it is utterly impossible to put hay in barns for ranch operation. At our own ranch, which is anything but big, we stack about 750



Sturdy Allis-Chalmers diesel bulldozer clears path round snowed-in barns.

tons per year. What we need when we have heavy snows is some means of getting out to that hay and some means of moving it. Also, we need some kind of equipment to move snow away from barn doors, out of the corrals, etc. A track-laying tractor with a bulldozer seems to be the only answer."

"The tractor (Allis-Chalmers with G.M. diesel engine) and bulldozer shown in these pictures came from Fairfield, Iowa. Julius Diers is the owner of it. I believe that he and his partner had two or three tractors with bulldozers in the ranch country."

"Roads were completely tied up to the extent that the mail man didn't even get to our place throughout the month of January. People didn't get to town in that time but suffered no hardships since they usually keep two or three months supplies on hand."

International Harvester's Harvester World Editor gave their entire back cover to a full page picture of one of their diesel crawler tractors with bulldozer clearing way to hay stack for a herd of hungry whiteface cattle in Nebraska. Said the condensed story under picture:

"RESCUE ON THE RANGE: This was a winter the west would remember. Weather experts had to go back as far as 1899 to find another like it. In both winters, blizzard had followed blizzard, bitter cold had hung on for weeks at a stretch, howling winds had piled snowdrifts high enough to bury feed stacks on the range."

"Nature had man completely at its mercy in '99, and still had the upper hand in '49. But the gap was narrowing. In 1949, man had C-82 'Flying Boxcars' dropping bales of alfalfa hay to marooned cattle and sheep. On the ground he had diesel crawlers with bulldozers attached."

"On the Peterson Brothers ranch near Alliance, Nebraska, this International crawler tractor, with dozer attached, cleared the way to buried hay and uncovered it. For the cattle in the background, the tractor's performance meant considerably more than a few square meals. It provided the nourishment they needed for survival."

Colorado State Highway department reported these diesels in action in that state to open the roads:

Tractors	
1-1935 Caterpillar .....	RD 8
2-1936 Caterpillar .....	RD 8
7-1937 Caterpillar .....	RD 8
1-1934 Caterpillar .....	50
1-1946 Caterpillar .....	D 7
1-1932 Cletrac (Hercules Diesel) .....	80
2-1935 Cletrac (Hercules Diesel) .....	80
2-1936 Cletrac (Hercules Diesel) .....	DD60
2-1934 McCormick Deering (International) TD40	
1-1946 Allis-Chalmers (G.M. Diesel) .....	H-D14
Motor-Graders	
2-1938 Caterpillar .....	11
2-1941 Caterpillar .....	12
Trucks	
2-1936 F.W.D. ....	MJ5



# "WINQUATT" LICKS COLUMBIA RIVER RAPIDS

By CHARLES F. A. MANN



WINQUATT arriving at The Dalles with 1,500,000 gallons of gasoline in tow.



← Captain Leppaluoto and his dog "Nigger" about to enter Seabee amphibian—the company's dispatching plane. Note WINQUATT with tow in background.

ALMOST a hundred years have passed since the first immigrants to the Pacific Northwest, after braving the old Oregon Trail afoot and on horseback, gazed on the mighty Columbia.

Hardly had the settlers began streaming into the old Oregon Territory from the East, when it was realized that river transportation on the Columbia network would lessen their troubles and save miles of difficult trail and road building. Every kind of river scheme quickly came to the fore, but, because the Columbia is literally a series of long, quiet pools—miles wide in flood time and hundreds of feet wide in slackwater, broken by swift rapids, stairstep fashion all the way down from British Columbia, or from the headwaters of the Snake River in Wyoming, its chief tributary, the Pioneers considered that continuous river navigation, taken seasonally or by the yardstick of miles, impossible, however robust the stern and sidewheelers might be built, or how shrewd the river pilots might become.

The idea of river navigation lived on to modern times, stubbornly refusing to believe that some way could not be found to push those 10,000 ton loads upriver cheaper than by rail or road.

As the cost of land transportation gradually rose, in the early 30's two or three individuals began visualizing navigation from Portland to the Dalles, using the quiet Bonneville Pool and Bonneville Locks, to extend river navigation 100 miles inland from Vancouver.

The first vessel to deal with the peculiar problems of upriver navigation was the "Inland Chief," a unique idea to haul petroleum products upriver in tanks inside the hull, and bulk grain downriver in the squat deckhouse. Due to insufficient power and poor handling characteristics this vessel lost out and its owners went broke.





Meanwhile a young and imaginative fisherman-tugboat man from Grays Harbor, Washington, A. Leppaluoto, came down, saw the river at low and high water, and visualized the possibilities of an entirely new concept of how to conquer the wild Columbia, continue up The Dalles Celilo Canal, and buck the 12-knot currents with a type of tug and river tow never before used anywhere in the world.

A tall, handsome, friendly man, shrewd in countless ways, where others had thought in terms of hundreds of horsepower, Leppaluoto knew from the start that everybody who had tried and failed in the 90 years before him, because they *thought in terms of too low horsepower.*

Tugs of great power required huge investments, and Captain Leppaluoto went directly to the largest financiers and biggest banks in the Pacific Northwest, and with his enthusiasm, fire, and foreknowledge of the things to come on the Columbia, he sold his ideas one by one.

Capt. Leppaluoto foresaw a long future. If, in the interval between construction of further dams up the river to complement the giant Grand Coulee and the Bonneville and, carry quiet slack-water navigation a piece at a time into the heart of Eastern Oregon and Washington, 2 or 4,000 hp. diesel tugs could push 4,000 ton barge loads upriver in the wild, uncontrolled Open River, why couldn't these same tugs push 12 or 15,000 tons upriver later on when the additional navigation improvements and multiple purpose dams are built?

He went to shrewd L. H. Coolidge, of Seattle, experienced student of ship design, who had spent a lifetime innovating and working out unique ship design problems, already having designed a small mailboat for the Snake River.

Coolidge and Leppaluoto together designed a ship that would almost exactly fit the Celilo Canal and Bonneville Locks. It was 106 ft long x 26 ft. beam, and called for two 1350 Enterprise diesel engines, equipped with the first Buchi exhaust turbochargers ever put on a diesel in the U.S.A. This vessel was the famed *Keith*, of 1939, which began pushing barges safely upriver in all conditions of weather, load and water, as far east as Pasco, Washington, 328 miles above the ocean at Astoria.

So highly successful was the really high powered *Keith*, the first tug designed totally for work treacherous in rapids with heavy loads, that 5 years later Naval Architect Coolidge began dreaming of a triple screw diesel tug, having 3, instead of 2, 1350 hp. main engines.

Meanwhile the war and wartime secrecy clamped down on the vital mid-Columbia transportation operations rapidly growing under Leppaluoto's leadership, and, from a single company to operate the *Keith*, he and his associates gradually took over everything on the Upper River.

The fleet expanded over the years to keep pace with the growth of traffic. The old *Inland Chief* was converted in 1918 to a tug from its former status as a tank barge. It is 106 x 38 ft. overall and carries three 1000 hp. Enterprise diesels. The *L. H. Coolidge* is a 130 x 30 footer with two 690 Fairbanks Morse Diesels. The *Frances*, a former L.S.T. with principal dimensions of 125 x 38 is powered with two 350 hp. Atlas diesels. The *Mystic* a small tug of 54 x 16 has a 350 hp. Superior diesel. The *Ostrander* is 50 x 12 ft. and carries a 220 hp. Superior diesel, and the 35 x 10.6 ft. *Jeep* with a 165 hp. GM diesel rounds out the fleet, except the giant *Winguatt*, described in this article. Her design is based on Columbia River experience and carefully calculated economics.

The steel, triple screw diesel tug *Winguatt* was built and went into service in the middle of strict wartime secrecy and little has ever been made public about it until now.

The vessel is 106 x 30 ft. with draft varying from 7 ft. to 11 ft. and is powered with three identical Enterprise diesels of 1350 hp. each, equipped with Elliott-Buchi turbochargers. Built according to experience gained by Capt. Leppaluoto personally during the years he operated the *Keith* himself, the *Winguatt* was designed to push multiple barge tows up the Columbia against 12 mile per hour current. Great emphasis on high power and maneuverability was necessary to handle heavy tows in the low-water rapids and narrow, low-water channels, as well as against flood currents in the Spring. Prior to *Winguatt* it had been the practice to push 650 to 1,000 tons at one time up the river. Now it is possible to push 3000 tons upriver at one time.

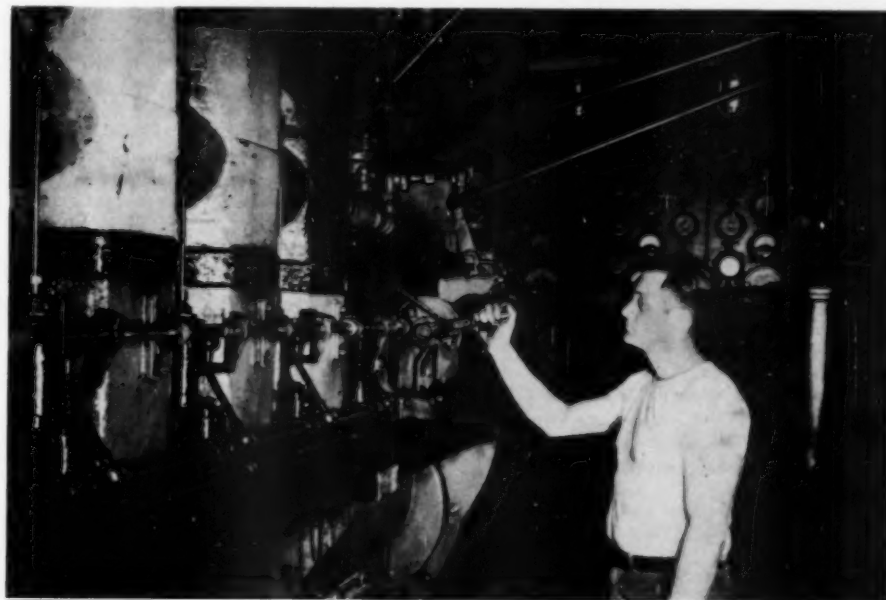
Built to American Bureau specifications, with a minimum draft of 7 ft., the maximum permitted in the restricted channels above The Dalles, the *Winguatt* does not have a tunnel stern thus departing from prior concepts of river tugs. The peculiar hull design gives maximum weight lifting capacity and maneuverability within the tight limits of beam and length imposed by Bonneville locks and the Celilo Canal and three-series locks.

With fuel capacity of 80,000 gallons, *Winguatt* can operate 25 days at sea or equivalent on the Columbia below The Dalles, without refuelling. The Enterprise supercharged diesels, with oil cooled pistons and full auxiliary and accessory equipment, have operated consistently without failure in the world's roughest operation afloat.

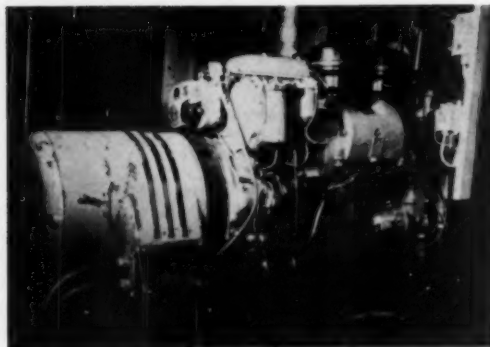
Now, let Captain Leppaluoto himself tell you the story of *Winguatt*.

The tug WINQUATT on the Columbia River.

Chief Engineer Ralph Curtis of the WINQUATT at controls of one of the three, 1350 H.P. Enterprise engines.







One of three, General Motors Auxiliary Generator Sets, on WINQUATT.



WINQUATT breaking through ice with three-barge tow on Columbia River.

Her engine room is completely outfitted with numerous small motor driven pumps for various uses, together with complete toolboards and gauges for the main and auxiliary engines.

The vessel is in itself an electrical powerhouse. In its upper engine room it has three generating units producing 150 kw. for its power needs. These are: two 60 kw., 220-440 volt, AC Delco generators, each driven by a 6 cylinder General Motors diesel engine; one 30 kw., 220-440 volt, AC, Delco generator, driven by a 3 cylinder General Motors diesel engine.

The three main Enterprise diesel engines turn Coolidge propellers through 7 in. tail shafts, which revolve in Goodrich cutlass rubber bearings.

A feature of the *Winquatt* is a 45 ton automatic towing winch built by Willamette Iron and Steel Co., of Portland, Oregon, and powered by two 50 hp. Westinghouse reduction gear motors. Located directly above the towing machine is a tripod mast and a 25 ft. boom capable of handling 15 tons. A Markey power capstan, driven by a Westinghouse 15 horsepower electric motor is mounted on the stern alongside of the towing winch. On the bow is located a Markey combination anchor and double drum cable windlass, driven by a 20 horsepower Westinghouse electric motor.

Three staterooms and a shower are located forward. Between the engine room and the forward staterooms is the modern fully equipped galley and cook's stateroom. In the forecabin on the port side is another large stateroom and on the starboard side the storeroom. The Captain and mates have separate quarters, and there is also a guest room for those who come aboard to enjoy the scenic trip up the Columbia River.

The heart of the operation of this powerful towboat is centered in the pilot house. Unlike most powerful towboats which are controlled by an engineer in the engine room by means of telegraph from the pilot house, the *Winquatt* is equipped with pilot house controls where everything from radio telephone to engines are under the direct supervision of the Captain. Such centralization greatly facilitates safe operation on the difficult upper Columbia.

In the *Winquatt's* rounded pilot house is located

the power steering wheel. The vessel can be maneuvered from four separate control stations, one on the port and one on the starboard side in the pilot house, one on top of the pilot house and a control stand on the after boat deck. Two searchlights and two floodlights are located on top of the pilot house.

The 65 watt Intervox radiotelephone keeps the tug *Winquatt* in constant touch with KLP, The Dalles radio shore station, as well as with other boats on the river.

All of the vessels of the Upper Columbia River Towing Company are also equipped with large fire pumps, which in effect make them auxiliary fire boats for fighting fires on other ships or docks. Two nozzles and three hydrants are conveniently located aboard the *Winquatt*.

After 41½ years of operation, the tug *Winquatt* still remains the most powerful towboat in the world. Those who have had the pleasure of riding this powerful tug and have witnessed the ease with which she pushes 4000 tons of cargo in front of her between Celilo and Umatilla, Oregon, are high in their praise of her excellent performance.

Under favorable water conditions, which provide a wider channel width on the upper Columbia occurring about six months every year, the *Winquatt's* ordinary chore on the upper river is to push three barges loaded with 1,000,000 gallons of gasoline and several empty wheat barges between Celilo, Oregon, approximately twelve miles above The Dalles, Oregon, and Pasco, Washington.

It is interesting to note that the elevation above sea level at Celilo, Oregon, 201 miles above the mouth of the Columbia River, is 127 ft. Tows proceeding up river from Portland, Oregon, reach this elevation by passing through the navigation locks at Bonneville and The Dalles-Celilo Canal with three sets of locks. From Celilo to Umatilla, Oregon, the Columbia River falls 119.81 ft. in 88.22 miles. Of this total fall 62.2 ft. occurs in twelve rapids, having a total combined length of 11.93 miles or 51.9% of the total fall in 13.5% of the total distance. The average fall in the rapids is 5.2 ft. per mile. Several of the rapids have a fall of 8.2 per mile. This accounts for the tremendous horsepower required to push tows up

the Columbia River. Captain Leppaluoto is looking forward confidently to the future with the knowledge that before long a dam will be built at The Dalles, Oregon, which will then make it possible to push tows of 10,000 to 15,000 tons at a time up the upper Columbia River.

At present the McNary Dam is under construction at Umatilla, Oregon and when completed will make easy going for tows between there and Pasco, Washington. At the site of the McNary Dam, the Umatilla Rapids have a fall of 11.4 inches in a mile.

Celilo, Oregon, 201 miles above the mouth of the Columbia River is 127 ft. above sea level. At Pasco, Washington, 328 miles from the ocean and 127 miles from Celilo, the elevation above sea level is 312 ft. A tug pushing a tow between Celilo and Pasco will have pushed her tow up-hill through numerous rapids and has elevated this tow 185 ft. in 127 miles without having passed through any dams or locks. In several rapids the vessel must push her tow where the water elevation raises 12 ft. in one mile. The vessel's return tow from Pasco consists of empty gas barges and loaded wheat barges.

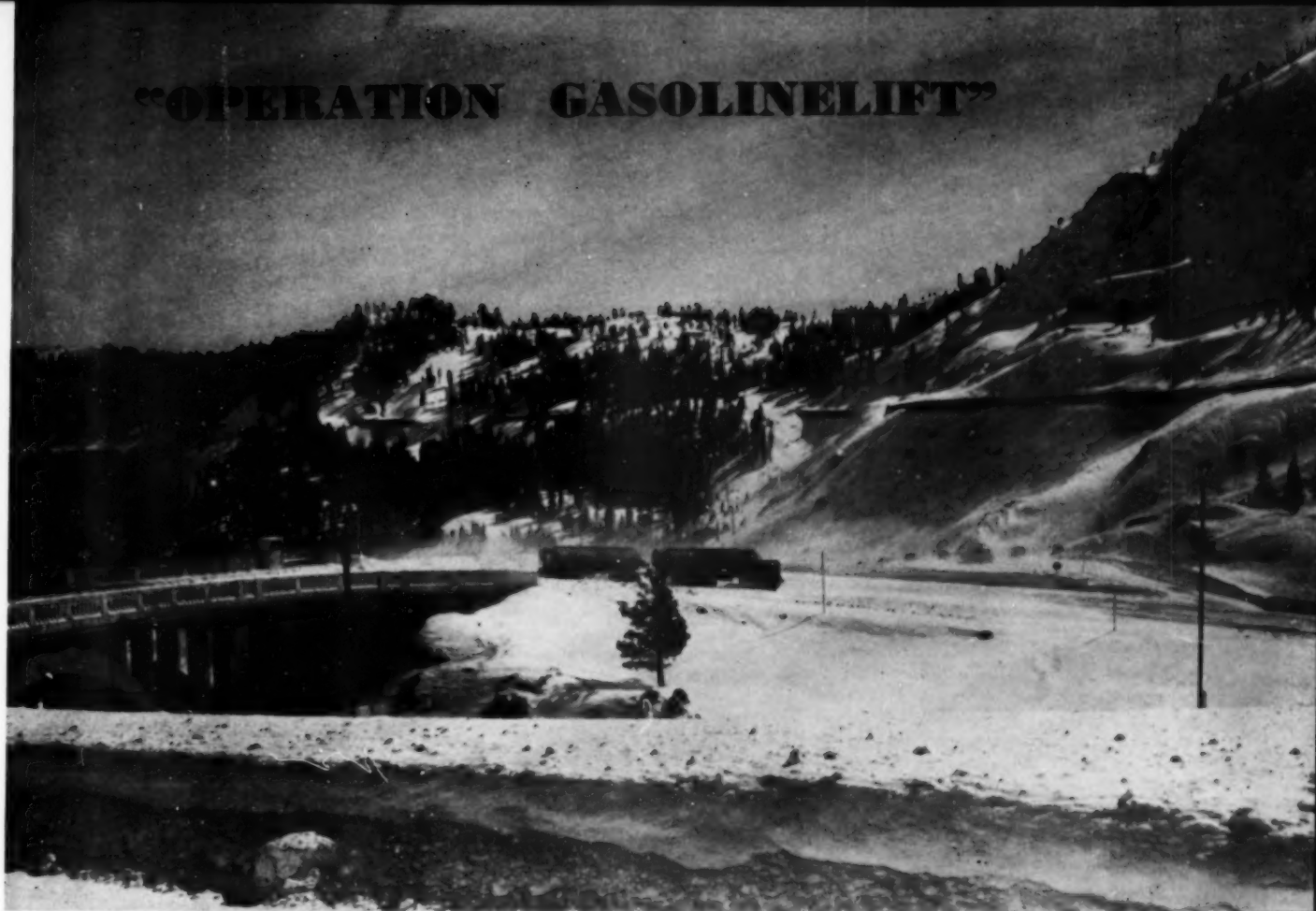
The *Winquatt's* crew are necessarily young men who predominate in the crews operating boats of the Upper Columbia River Towing Company. The Captain of the *Winquatt* is Othel Boyle; First Mate, Keith Rodenbaugh; and Second Mate, Darrel Gutzler.

The Upper Columbia River Towing Company and associated companies operate thirty-one bulk petroleum and general cargo steel barges and four large wooden general cargo barges. To augment this fleet of barges they operate in addition twelve high powered diesel tows; complete repair facilities are maintained at The Dalles, Oregon, for the construction and repair of their equipment, including a 1000 ton floating dry dock. Under construction at the present time at The Dalles, Oregon, are two 1000 ton steel petroleum and general cargo barges.

Not satisfied with the present powerful fleet, Captain Leppaluoto is looking forward to the ultimate construction of a towboat of 6000 horsepower, using design details developed in the *Keith* and *Winquatt*.



## "OPERATION GASOLINELIFT"



A Kenworth diesel-engined truck about one-quarter of a mile from Donner Summit on the eastern slope of the highway from Richmond, California, to Fallon, Nevada.

**P**OWERFUL highway diesel driven trucks, as well as airplanes, played an important role in that now famous "Operation Haylift," during which hay was dropped to thousands of starving livestock, trapped by blizzard conditions in the Southwest. Lang Transportation Company, operating a fleet of Kenworth trucks out of Sacramento, were responsible for the regularly scheduled hauling of high octane gasoline from Richmond, California, to Fallon, Nevada, for delivery to the Air Force at that point.

Covering a round trip distance of 612 miles, Lang Transportation Company operated its diesel trucks through some of the worst weather conditions the West has ever seen, over icy roads, across difficult Donner Summit which reaches an elevation of 7,135 ft., but trained drivers and first class equipment kept the schedule going without mishap.

"Operation Gasolinelift" began on January 24 and consisted of the delivery of from two to five truck and trailer loads of gasoline daily. A total of 328,000 gallons of fuel was transported. Lang service to Fallon, Nevada, operated on an exact schedule at all times, as the diesel trucks could not be unloaded at their destination until the tanks at Fallon were empty. At no time during the operation has the Air Force been forced to interrupt their flying schedule because of lack of fuel.

Throughout the operation, the trucks made the round trip in twenty-four hours with each load consisting of 7,250 gallons of 115 octane gasoline. "Operation Haylift" would have been impossible without highway transportation of fuel. The entire fleet of Kenworth trucks operated by Lang Trans-

portation Company are equipped with 275 hp. Cummins diesel engines. During the last war these same diesel-engined trucks performed a similar service, following the same route to Nevada and at times delivering as high as 18 loads of fuel a day for our Air Force.

High in the mountains, a Cummins 275 hp. Kenworth trailer truck owned and operated by Lang Transportation Company.





## HERCULES DIESELS FOR "TALGO" LOCOMOTIVES

**POWER** for operating the ACF *Talgo* type diesel locomotive is furnished by two high speed, heavy duty Hercules 8 cylinder Vee type diesel engines of 1468 cubic inch displacement and two Hercules 6 cylinder diesel engines of 895 cubic inch displacement.

Each of the two 8 cylinder diesel engines are coupled directly to a General Electric propulsion generator which operates at a maximum of 400 hp. at 1800 rpm., are supercharged and weigh 11.4 pounds per horsepower delivered to the propulsion generator. The ACF *Talgo* power plants are compact, with a minimum of weight. They are the first power plants to be used in main road diesel locomotives to operate at the higher crankshaft speed of 1800 rpm. This higher speed and materially reduced weight makes the arrangement ideal and most economical for fast passenger train service.

Keeping locomotives in operation with a minimum of time out for maintenance has been the keynote of design of the ACF *Talgo* locomotive and the engine-generator installation. A propulsion generator set can readily and quickly be replaced with a spare for periodical overhaul without interfering with the scheduled runs of the locomotive when in operation.

Each of the two Hercules 6 cylinder diesel auxiliary engines of the vertical type, installed on the *Talgo*, drive a 100 kw. alternator at a speed of 1500 rpm. These AC generator sets are responsible for supplying all of the auxiliary power required for light, heat and air conditioning in the coaches and locomotive as well as operating the brake system and cooling the engines and propulsion motors. The sets are designed with a minimum of weight and with an eye on speedy, low cost maintenance. The auxiliaries are mounted on rubber, the same as the main engines, to assure maximum smoothness in operation.

The two models of Hercules diesel engines used on the *Talgo* are of the solid injection, compression

ignition 4 stroke cycle type and include the patented Hercules combustion chamber.

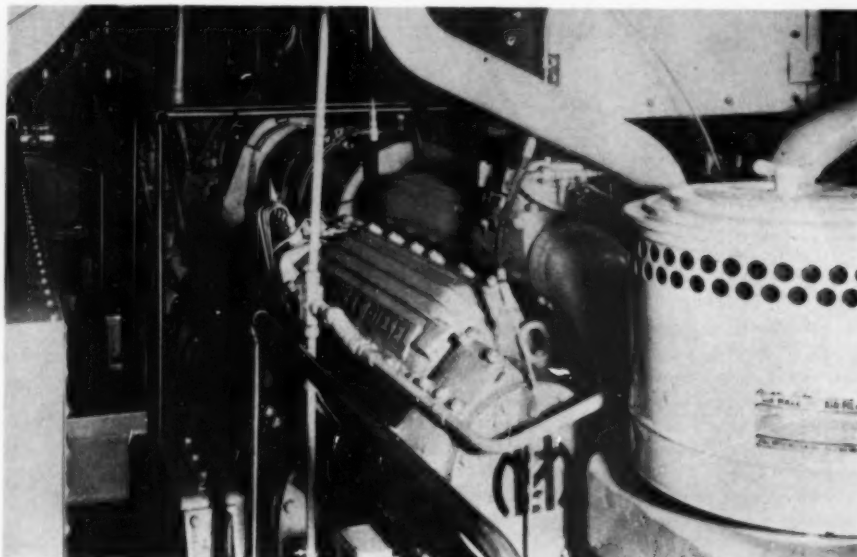
The Hercules combustion chamber is located at the side of the cylinder bore. During operation, as the piston proceeds to the end of its compression stroke, it passes across the passageway between the cylinder and the combustion chamber, thereby reducing its area and increasing the velocity of the air passing into the combustion chamber.

Both the main propulsion diesels and the auxiliary diesels, of the ACF *Talgo* locomotive, are installed on isolation and shock mountings, specially designed and assembled by the Vibration Eliminator Company. These mountings use the rubber-in-shear principle of resilient suspension, the same principle that has been used by the automotive industry for many years.

The decision to isolate the engines on the *Talgo* was in itself something of an innovation. How-

ever the use of the high speed automotive type engines in a light weight articulated train made it advisable to use isolation which not only prevents the transmission of vibration through the train but also reduces engine wear and so cuts maintenance costs and increases engine life.

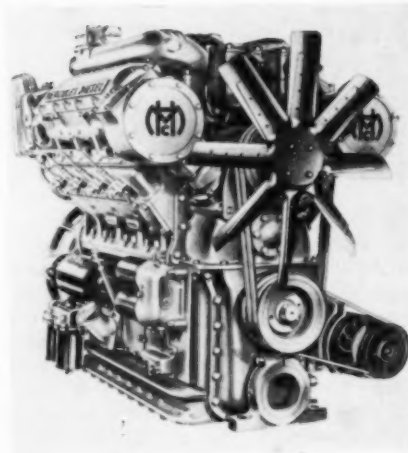
The complete newness of the undertaking made it advisable to establish safety factors far in excess of actual requirements. It was decided to design the Vibration Eliminators for the greatest degree of vibration absorption possible while restricting the engines to a limited physical movement, and at the same time hold the engines to their mountings and the locomotive frame in the unfortunate event of an accident. These Vibration Eliminators have also been designed and located so that the main propulsion generator set can be readily and quickly lowered into a pit and replaced with a spare for periodical overhaul without interfering with the scheduled runs of the locomotive economizing on tie-up costs.



Two Hercules 400 hp. diesel engines that are the main propulsion for the "Talgo". Center foreground, box-like equipment attached to sides of diesels are Vibration Eliminators.

One of two Hercules 6 cylinder diesel engines of 895 cu. in. displacement operate AC generator sets responsible for supplying all auxiliary power for light, heat, air conditioning.

Hercules 8 cylinder diesel engine which is the basic design of the two supercharged propulsion engines installed on the ACF "Talgo" train.





# DIESELS COMBAT CAUSES OF COMMUNISM

By FRED M. BURT

**"W**ITHOUT Water 'There Is No Life' is a truism that we all recognize, but to which we in this country, most of us pay little attention. We take fully adequate supplies of water as a matter of course. We read of floods and probably pay more attention to the news of these undesirable over-supplies of water, than to shortages, for we always have enough food available.

There are, however, great land areas in the United States, supplying vast quantities of all kinds of food, where rainfall is never adequate, where the life-giving water is brought to the fields by irrigation. Much of this irrigation water is pumped from underground water tables and particularly in the far southwest, diesel and natural gas engines are extensively used for this purpose.

A beautiful color film illustrating how arid California areas have been made immensely productive by irrigation has been shown by Johnston and Hallett Mfg. Co. (Los Angeles), engineers to governmental and commercial representatives of many countries of Asia, Europe, Africa, and South America, and to our own UNRRA and ECA officials. It has created considerable interest.

The emphasis in these countries is on "packaged" or "turnkey" units; diesel-pump, -generating, and -marine sets, with the simplest of installation, operating, and maintenance requirements. The peoples of the back-countries, on farms and in villages, have little mechanical experience, but given proper (though relatively elementary) training, they are quick to learn and intensely anxious to improve their lot.

All of these things and many more have been learned by representatives of Hallett Mfg. Co. in the course of supplying more than 10,000 one cylinder, 8-hp. and 2 cylinder 18-hp. diesel units used directly and indirectly, to supply more of the basic food and to raise standards of living. Austin Sherman, Hallett's Executive Vice President also spent three months in 1948 in the Mediterranean border countries to obtain a first hand knowledge of conditions. Four of the company's sales and service engineers are constantly traveling through the countries where the Hallett diesels help combat the shortage of food. These small diesel units are now going to practically every country in the world except behind the Iron Curtain, where, ironically the need for good American diesels

and other machines, is as desperate as in many of the world's most underprivileged countries.

Except for radical fringes, people with full bellies are not attracted to Communism. But when the reverse is true to the point of starvation, Communism or any ideology that promises better conditions, can easily take hold. However, the concrete fact of water gushing from a diesel-driven pump to fill irrigation ditches and assure bounteous crops each year, is a far more potent economic and political factor in the minds of the people than idealistic promises.

From the experience and reports of Hallett's representatives in many lands, nothing gives a greater return for a comparable investment, or gives quicker action in food production, than the indicated application of diesel engines. The emphasis is on the small diesel, for the farms are small, as are the villages where diesels power little shops, mills, and lighting facilities. Along the coast, such as in Greece, small diesels also power the fishing boats.

The adoption of the diesel engine as the ideal power unit for the extraordinarily wide varieties of application, both present and potential, in these underprivileged countries of the world is no accident. The problem answered itself without much choice. There is little electricity available, none of these countries having anything to compare to our Rural Electrification (which in itself is not inclusive enough to prevent there being a huge American market for diesel-electric sets.) Gasoline is a premium product, and is highly taxed, for it is considered to be a luxury item in most of its uses. Its cost runs from 60¢ to \$1.50 per gallon while diesel fuel in the same countries will run from 12¢ to 25¢ per gallon. Then there is the added advantage in using the latter for the actual power output is about 1/3 greater.

Out of a total of approximately 3700 Hallett diesels shipped to Greece since the war, supplied through UNRRA and ECA (Marshall Plan), there were 2,000 pumping units. In this "Republic of Hellas," there are nearly 8,000,000 people packed into an area about the size of North Carolina. Only one-fifth of the land is arable, and not very good soil at that. Without water the food situation gets to be desperate. The climate is about the same as in Southern California. The principal crops are wheat, rye, barley, oats, corn tobacco, olives, lemons, oranges, mandarins, ap-

ples, pears, figs and nuts. The pumping units have made a notable addition to food production. The D1-A pumping unit has average capacities of 1160 gpm at 20' head, suction included or 251 gpm at 100' head; the D-2 (18-hp.) 2610 gpm. at 20' head or 320 gpm at 100' head. Translated into movement of water to irrigate relatively small farms or for village water supplies, it is a push-over for the diesel units.

Other large additions to the food supplies come from small fishing boats powered with about 125 of both sizes of the Hallett marine diesels.

The chief difficulties encountered were due to "bad installation, operation and maintenance of the machinery," in the words of Dr. Frixos Letsas, Mechanical Engineer of Athens, employed by the Hallett representative (Messrs. J. Kazazis Sons and Em. Gazis) to make a survey in the Nauplion region where some 100 Hallett engines and Johnston deep well pumps were in use after allocation by the Greek Ministry of Agriculture, who also reported that the pumps and engines were received in excellent condition and that the recipients were showing great enthusiasm for them. In spite of their lack of technical education, farmers found the equipment simple to operate and maintain. Where breakdowns had been occasioned by faulty installation or operation through ignorance, these have been easily remedied and full instruction booklets in Greek are now being prepared for circulation which, coupled with practical instruction in a demonstration plant in Athens, will provide adequate basic education. Dr. Letsas lectures once a week in this "school" and good attendance is obtained through press announcements especially after summer farm activities are over.

But with all this, there are still thousands of wells in Greece where the water is raised by a blindfolded donkey walking in a circle endlessly, to "crank" the water up out of the open well. The wells range from 30 to 150 feet deep, average 60 feet. Most of them need diesels and pumps—the most advisable spending of ECA money would buy these units, for the quickest method to provide food self-sufficiency.

All-in-all except when selfish and totalitarian political interests make it impossible, the day of the diesel in food production, in the under-privileged nations of the world, is at hand.



Hallett exhibit in the Near East, International Fair—Izmir, Turkey.



# THE DIESEL ENGINE AND HIGHER EDUCATION

By THEODORIC C. LINTHICUM

Captain, United States Navy (Retired)

**W**ITH the rapid advancement of the diesel engine as a prime mover in many fields of industry, the increasing need for skilled technicians becomes more and more apparent. Gone are the days when any "shade tree" mechanic can operate and service the diesel engine to its fullest efficiency.

Operators must be specifically trained in order to obtain the maximum possible from the modern diesel, because of the increase in speeds, mean effective pressures, and resulting increases in horsepower output. This includes a thorough knowledge of fuels, lubricating oils and combustion

principles, as well as the actual mechanics of the engine itself. Horsepower ratings, their significance and how they are determined, are also of the greatest importance.

It has been remarked "the heart of the Diesel engine is the fuel injection system." A thorough knowledge of this important function cannot be obtained by haphazard means. A complete and systematic course of instruction is necessary to master its operation, and to make it function properly at all times under varying conditions.

It was with these thoughts in mind and to provide

a really adequate diesel educational system that Mr. Ralph Hemphill, long famous in diesel circles for his Hemphill Diesel Schools, recently transferred the Los Angeles School to West Coast University. It is now being operated as a Department of the University, thus providing a practical laboratory for the degree course, and also continuing to give training on the vocational level, both to residential and home study student. Thus West Coast University becomes unique because it combines a College of Engineering granting a Bachelor of Science Degree with Departments training students in technical and vocational work.

The Diesel Department is under the direct supervision of Mr. K. E. Taylor who is a highly trained and experienced man in this field. Mr. Taylor has organized the diesel courses into departments so that they embrace all phases of diesel training. Instructional staffs devote adequate time and individual attention to each student. These instructors direct students along lines best suited to their individual capabilities and requirements.

The training is organized in such a manner as to give each student practical experience in the complete overhaul, tune-up and operation of the various types, makes and models of modern diesel engines. By actually doing the work with his hands the student becomes better acquainted with the engines and with the troubles which may develop in operation.

Realizing the necessity of classroom instruction combined with laboratory demonstrations for a well rounded course, one hour a day of a five hour program is devoted to this combined type of instruction. In the classroom the student is taught the basic reasons for his manual work in the shop. During this classroom period students are allowed a free discussion on questions relating to the subject matter of the day, as well as related subjects. Periodically, films are shown, demonstrations given and parts are analyzed in conjunction with lectures on new developments in the industry.

Typical subjects studied and discussed:

Constant Pressure Combustion	Compression-Ignition
Parts of Diesel Engines	Fuel Injection Systems
Pressure and Forced Feed Lubrication	Cooling Systems
Fuel Injection Pumps	Fuel Injectors
Lubrication-related problems	Fuel Oil—properties & care
Governors	Pumps
Air Compressors	Starting Systems
Principles of Electricity	Generators and Motors
Locomotive Engines	—Operation and Construction
Operating Procedures	Turbo and Supercharging
	Engine Testing

On starting the course every student is first placed in the department devoted to the use of hand and machine shop tools as this training is a necessary prerequisite to the proper care and operation of any machinery. In this department the student is taught how to use var-



Students overhaul caterpillar diesel.



ious types of precision instruments, layout work and related tools. It is upon this foundation that future, successful and profitable training is based.

The machine shop is completely equipped with lathes, milling machines, shapers, etc., and the student has ample opportunity to actually use these machines to make tools and various engine parts. The parts are then put to practical use in the shop in order that the student may be able to see, and correct his mistakes in the making. After this indoctrination course in the use of tools the student progresses through basic engines.

Here he learns the principles of the combustion of fuel, general overhaul and tune-up. He progresses next to the more complicated engines of various makes, and it is in this sequence that a full understanding is accomplished.

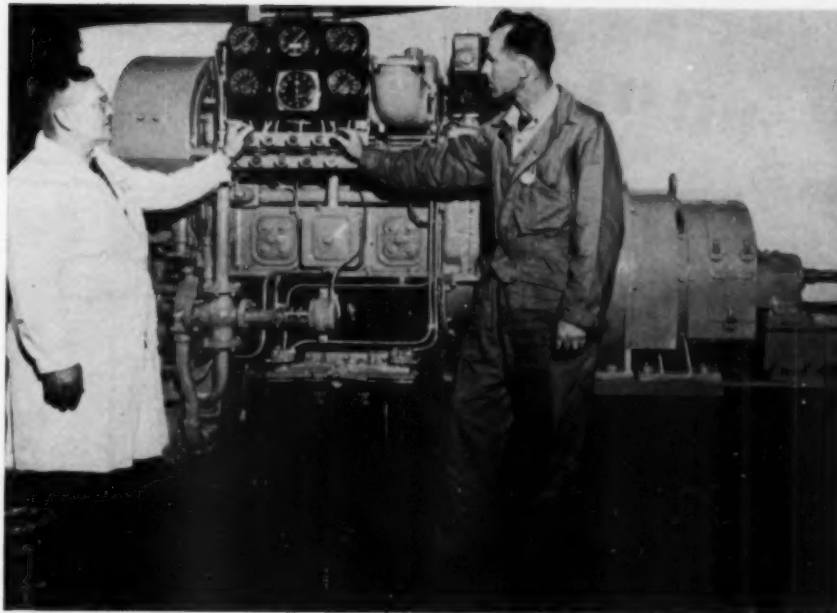
The engines on which the student receives instruction include:

- Supercharged type Hercules DWXDS with heat exchangers and reverse gear
- Hercules DRX engines
- Hercules DJXB
- 4-cylinder Model H Cummins
- 6-cylinder Model H Cummins with transmission and compressor—truck engine
- Witte 1-cylinder—horizontal
- General Motors 671 type
- General Motors 371 type
- Winton 3-cylinder common-rail type with generator and board
- Fairbanks-Morse 6-cylinder—210 horsepower
- Buda-Lanova 6-cylinder
- Buda 4-cylinder complete with reverse gear
- General Motors 567-A 12-cylinder V-type locomotive engine
- Waukesha 4-cylinder complete with generator and switch board
- Caterpillar—Tractor type 4-cylinder
- International Harvester 4-cylinder tractor type
- ... to mention only a few ...

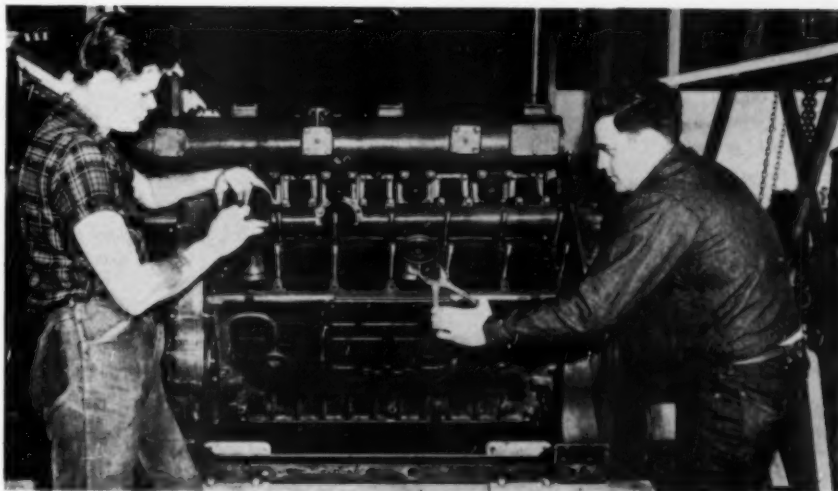
During the course the student spends a period of time in the fuel pump and injection laboratory—a separate, modern instructional room devoted to studies of construction and operation of injection equipment. Students go into the pump room in groups of five. One instructor devotes his full time to this group giving each student personalized and individual instruction. Ex-Cell-O, American-Bosch, International Harvester, Cummins and other types of injection equipment are studied. Exploded-view charts are provided on all this equipment. In each case the student tests his work on a calibration stand.

Pumps on running engines are overhauled and put on the test stand in the pump room by the student, who thus can easily see the result of his work. In each case this work is checked by the instructor and his mistakes are pointed out to him. This same procedure is used in many similar checks throughout the course.

The question arising in the minds of most stu-



Instruction on General Motors engine.



Pistons and liners being replaced in Gray diesel.

dents is the natural one of employment after completing the diesel course. Some already have jobs, and are merely on leave from various organizations for the purpose of gaining additional valuable instruction in the diesel field. For those who are not so fortunately situated the University maintains a well organized and complete placement service. It maintains constant contact with the industry and is successful in placing many students in excellent positions. This service is continually expanding, and is open to all graduates. However, many have obtained their own jobs and have been quite successful in them, and still others have established their own business in the diesel field.

Some students have elected to continue their education even further in the higher branches of

engineering. Opportunity for this is available by enrolling as a student in the College of Engineering of the University. In this they can choose the branch of engineering they desire, and can complete the usual four year course in three years, because of the intensive program of the West Coast University, and the diesel department. Larger laboratories, machine shops and other student facilities will be provided on the conveniently located seven acre campus—centrally situated in Los Angeles at Western Ave. and Venice Blvd.

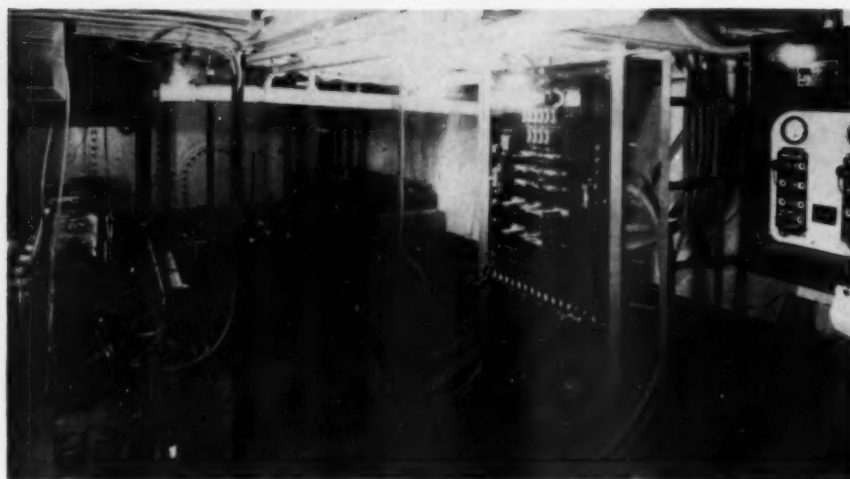
Southern California, and in particular the Los Angeles area, is rapidly becoming one of the world's great industrial centers. In this atmosphere the enterprising student can obtain a thorough training in the diesel field.



# PILOT BOAT "SAVANNAH"

**T**HE M/V *Savannah*, a 64 ft. 11 in. all welded steel pilot vessel, was delivered to its owners, the Savannah Bar Pilots, in January, and has since been in constant use, working in the Atlantic Ocean off the entrance of the Savannah River.

Designed and built by the Brunswick Marine Construction Corporation, the *Savannah*, a type of vessel that should have wide utility as a general offshore personnel transport, light cargo and equipment boat, was developed to meet the require-



Six cylinder 165 hp. G-M diesel at left, which supplies power for pilot boat *Savannah*. Bromfield switchboard at right.

All welded steel pilot vessel M/V *Savannah*.



ments of the pilots who needed a vessel that would be able to operate regardless of weather and yet be comfortable for her crew; that would be fast and dry, as well as exceptionally strong to withstand the strain of going alongside larger ships in the open sea to transfer pilots. In her first month of operation this new vessel already has encountered a considerable amount of inclement weather, and the owners have reported that she has more than met their expectations of her performance on the water.

The *Savannah*, a 64 ft. 11 in. overall, 18 ft. 6 in. beam, 7 ft. draft, is a development of a small Atlantic dragger and is arranged with a deck house aft containing pilot house, galley and mess room, toilet, engine trunk, and pilots stateroom. Below deck she is arranged with a forepeak, an insulated and sheathed crews quarters for four men, with enclosed toilet room, an insulated engine room, and an afterpeak.

All outfit and equipment of this new boat are of the highest quality, and her finish, while economical to maintain, is yachtlike in appearance. Powered by a six cylinder 165 hp. General Motors diesel engine driving a Columbian bronze propeller through 31½ in. monel shaft, the *Savannah* in fully loaded condition with 1600 gallons of oil on board runs at a speed of a little over 11½ miles per hour. Steering gear is manufactured by Edson; batteries supplied by Gould; controlled by a Bromfield switchboard; bilge pump supplied by Marine Products. The efficient anchor windlass was manufactured by American Engineering Company and it is powered by a hydraulic system supplied by Vickers, Incorporated.



# DIESELIZATION ON THE KATY



Above and Left: Powerful diesel-electric locomotives, freight and passenger on Missouri-Kansas-Texas Railroad.

By DONALD V. FRASER, President, Missouri-Kansas-Texas Lines

**S**INCE the end of the war the Missouri-Kansas-Texas Railroad, in common with most other railroads throughout the country, has enjoyed a period of full employment and generally good business. However, our nation's difficult readjustment to peacetime stability, involving rapid changes in our economic pattern, has complicated railroad operations and management functions during that period. In order to keep pace with traffic demands, and to effect greater efficiency and produce greater economies, it has been necessary to adopt new methods of operation, provide new motive power, rolling stock, tools, facilities, and other innovations.

Diesel-electric motive power has been one of the answers on the Katy, and records to date show that our dieselization program is an economical, efficient step in the operation of our railroad. Shortly after the war we inaugurated a long-range program for the conversion of motive power on the Katy from steam to diesel-electric.

Today the railroad has diesel-electric locomotives in several service classifications, including road freight and passenger, and road and yard switching. Our first diesels were placed in service in mid-1946 followed by additional diesels during 1947 and 1948. Those now in service, augmented by those on order for delivery during 1949, will see the Katy well on the way toward its goal of eventual 100 percent dieselization. The economy of this modernization program has already been well proven in the performance of diesel equipment on our railroad.

For the purpose of illustration, let us take the records of our seven 3-unit, 4500-horsepower diesel-electric freight road locomotives which were in daily operation throughout 1948. Their performance figures give a good cross-section of Katy diesel efficiency in general. These seven freight diesels were, of course, operated in high density territory with full train loads, yet the results obtained demonstrated conclusively the savings to be effected with diesel-electric power.

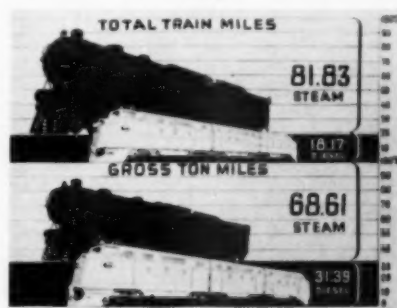
It has been conservatively estimated by our operating department that the operation of these seven diesel locomotives, during 1948, produced a savings in overall transportation costs of at least one million dollars after income taxes—a splendid and continuing return on the investment required for this equipment.

Percentage figures would perhaps serve well to illustrate this fact. During the year these seven diesel locomotives operated only 18.17 percent of total train miles, yet they handled 31.39 percent of gross ton miles.

The diesel locomotives are high in availability, also. For example, the seven freighters were assigned 1,230,374 miles. Of these assigned miles the locomotives operated an average of 100,209 miles per month, or 1,202,511 miles during the year. Thus the diesels, on an average for the year, filled their assignments 97.74 percent—a remarkable record, as any railroad operation man will agree.

It might be pointed out here that although some roads use more than 3 units on their heaviest locomotive combinations, the Katy's level road bed, with ruling grades on the main line of little more than one percent, enables 3-unit locomotives to handle heavy freight trains over most of our lines.

Chart showing comparison between steam and diesel locomotives—Total Train Miles compared to Gross Ton Miles.



In fact, considerable tonnage is now being economically handled with 3000-horsepower 2-unit freight diesels. Moreover, the addition of 6000-horsepower diesels is contemplated this year as and if tonnage justifies more power.

A word might be said here too about the diesel passenger locomotive which powers the "Texas Special." This locomotive was placed in service April 8, 1947, and up to and including December 31, 1948, had filled its assignment 100 percent.

Additional operational savings were realized in the operation of diesel switch engines, and Katy management is looking forward to substantial economies as more of this type of power is placed in service.

Equipment now in use on the Katy includes locomotives built by the Electro-Motive Division of General Motors Corporation, American Locomotive Company, Baldwin Locomotive Works and General Electric Co. Our smallest diesel is a 600-horsepower "road-switcher," used both as a switcher and in branch line freight train service. The largest locomotives now in use are 4500-horsepower, 3-unit freighters, used in fast, through freight service. Fleetest on the line is the 4000-horsepower, 2-unit passenger locomotive which powers our crack streamliner, the "Texas Special." Other units include 1000-horsepower switching locomotives and 3000-horsepower, 2-unit, road freighters.

We have found that diesel-electric locomotives are readily adaptable to two-way radio installations. The Katy uses such radio communication in yard operation and switching areas, on diesel switchers, and on diesel-electric through freight trains for end-to-end communication. Use of this radio equipment is proving economical and efficient, and is an added safety feature.

We on the Katy believe that the dieselization program set in motion since the war is our best provision for sustained earnings in the future.



# S

## Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

### Maintenance Schedules and Records

EVERY up-to-date supervisor and operator recognizes the value of a good maintenance crew and proper maintenance records. Much of the efficiency of a plant is based upon these two factors. Likewise every efficient supervisor has his own pet theories and ideas on maintenance and maintenance records.

Since all plants vary in design, equipment, operating conditions, load demands, systems of cooling, etc. it becomes quite difficult to set up a maintenance schedule or record which is applicable to all plants. This department does receive requests now and then for various types of forms, such as maintenance schedules and records, operating log sheets, material records, inventory

sheets and the like. When we do receive copies of these forms we file them away for future reference and every now and then come up with one which is just what the other fellow is looking for.

We recently received a copy of such a maintenance form, which in the writer's opinion is simple, yet gives the supervisor all the information that he would ordinarily require. Consequently we are passing it along to our readers as a model maintenance record which, with some few changes can be applicable to most any plant.

This record was supplied us by Mr. George Kreher, Superintendent of the Rushville Plant of the Southeastern Indiana Power Company and along

with the record he has furnished us with the following comments:

"I am attaching one of our engine maintenance forms which sums up our maintenance work on the four 3060 hp. Busch-Sulzer units, each of which drives a 2160 kw. generator.

Under piston inspection we log the following: Compression, taken at a 1750 kw. load. Firing Pressure, taken at a 2000 kw. load. Axial clearances between piston and cylinder head. Radial thickness of piston rings and ring replacements. The rings are replaced when they show a wear of .032" (usually at the gap). Normally the top ring is replaced after 6000 hours of operation.

Rushville plant engine maintenance form

Engine No. 17

SOUTHEASTERN INDIANA POWER Co.

DATE	1	2	3	4	5	6	7	8	9
Engine No.									
Full Piston 4,000 hrs.									
General Piston and Ring Condition									
New Ring Piston Rings									
Head Ring Gap Clearance									
Head Ring Seal Condition									
Cylinder Ring Clearance									
Wrist Pin Ring Clearance									
Bottom									
Compressor Discharge									
Blower Discharge									
Blower Gauge Readings									
Fuel Valve Condition									
Check 4,000 hrs.									
Check 8,000 hrs.									
Check 12,000 hrs.									
Check 16,000 hrs.									
Check 20,000 hrs.									
Check 24,000 hrs.									
Check 28,000 hrs.									
Check 32,000 hrs.									
Check 36,000 hrs.									
Check 40,000 hrs.									
Check 44,000 hrs.									
Check 48,000 hrs.									
Check 52,000 hrs.									
Check 56,000 hrs.									
Check 60,000 hrs.									
Check 64,000 hrs.									
Check 68,000 hrs.									
Check 72,000 hrs.									
Check 76,000 hrs.									
Check 80,000 hrs.									
Check 84,000 hrs.									
Check 88,000 hrs.									
Check 92,000 hrs.									
Check 96,000 hrs.									
Check 100,000 hrs.									

GEAR INSPECTION 4000 HRS.

BLOWER - 3500 HRS.

FUEL PUMP & STARTING AIR VALVE 20,000 HRS.

Engine No. 17

Check 4,000 hrs.

Check 8,000 hrs.

Check 12,000 hrs.

Check 16,000 hrs.

Check 20,000 hrs.

Check 24,000 hrs.

Check 28,000 hrs.

Check 32,000 hrs.

Check 36,000 hrs.

Check 40,000 hrs.

Check 44,000 hrs.

Check 48,000 hrs.

Check 52,000 hrs.

Check 56,000 hrs.

Check 60,000 hrs.

Check 64,000 hrs.

Check 68,000 hrs.

Check 72,000 hrs.

Check 76,000 hrs.

Check 80,000 hrs.

Check 84,000 hrs.

Check 88,000 hrs.

Check 92,000 hrs.

Check 96,000 hrs.

Check 100,000 hrs.

NOTE - Total Engine Hours To Be Logged With All Entries. All Entries To Be Initialed By Man Making Inspection.



The cylinder liners are measured at each piston inspection and logged on the reverse side of the maintenance form.

The main bearing shells and wrist pins are checked at 12,000 hour intervals and clearances reset to .005". The crankpin bearings are checked at each piston inspection and clearances reset to .005", the crankshaft being 13.750" in diameter. Crankshaft deflections are checked twice a year.

The fuel valves are pulled every 1000 hours and checked for pressure, dribbling and spray. The tips are cleaned without the valve being disassembled. Disassembly and grinding of the fuel needles is only done as a last resort. If a valve

dribbles it is disassembled and cleaned thoroughly, reassembled and tested again. If it still leaks the needle valve is then ground in.

The fuel pumps are pressure tested every 1000 hours to check the spill valves and suction valves for tightness. This is done by use of the priming lever. The fuel pumps are completely overhauled every 20,000 hours.

With the exception of the above mentioned items, I believe all the other entries on this maintenance schedule and form are self explanatory."

Supervisors' opinions vary on maintenance scheduling. Some prefer inspection of fuel nozzles and atomizers once a month where operating schedules

make it possible, others do not inspect these parts as often. Much of this inspection work depends upon the type of fuel used, conditions under which this fuel is handled, type and nature of the cooling agent, etc.

So in summarizing the matter of maintenance records and forms, while the one shown seems to cover most of the vital points involved, in the final analysis it merely acts as a guide in formulating your own form, and any special conditions which may be applicable to one's own plant would have to be arranged for in the above form. We will be glad to entertain any suggestions or suitable forms from our readers along with comments on their experiences with maintenance schedules.

## Exchange Your Diesel Maintenance Ideas

CONDUCTED BY R. L. GREGORY

### "SOME SUGGESTIONS ON MAINTENANCE"

**T**HE following suggestions on maintenance have been received by this department and are being passed along to our readers.

1. Ofttimes in diesel operation it becomes necessary to remove connecting rod bearings for inspection or replacement. In so doing it is necessary to have the crank in the proper position and to hold it there, since many units become unbalanced when a piston with its attendant connecting rod are removed from the bearing. This has a tendency to throw the crank in the wrong position for properly working on the bearing. Mr. Monson shows the method which he uses in holding the crank in position.

The sketch illustrates his idea of using a bridge

plank in order to put a brake on the flywheel and thus control the position of the crank by controlling the turning of the flywheel. When the crank has reached the desired position so as to make it easily accessible for either removal or installation of the bearing the plank is wedged tightly against the flywheel by being driven in place with a sledge. At the same time he keeps all the cylinder cocks closed. This also has a tendency to use the compression of the remaining pistons as a brake.

The idea is a feasible one and a means of safety for those working on such bearings. On many units equipped with barring gears the gears are left engaged but the current turned off the barring gear motor so that some worker will not inadvertently start the motor while workmen are in the crankcase. Some units equipped with manually operated barring gears are equipped with ratchets which can be locked in position so that the crank cannot be turned.

2. The second suggestion has to do with keeping dirt from falling into the crankcase while cleaning the cylinder walls and ports. This too is of vital import in maintenance work. In order to keep the carbon and dirt from falling into the crankcase of our Fairbanks Morse engines we have made a circular pan 14 inches in diameter and 1½ inches deep out of 16 gauge sheet metal.

This pan is suspended under the cylinder by means of brackets held in place by ½ in. cap screws which are inserted into tapped holes in the lower side of the cylinder liner. On this unit these are the holes provided for the piston clamp bolts. The brackets are bent in such a fashion that they project under the pan. The pan is kept from tip-

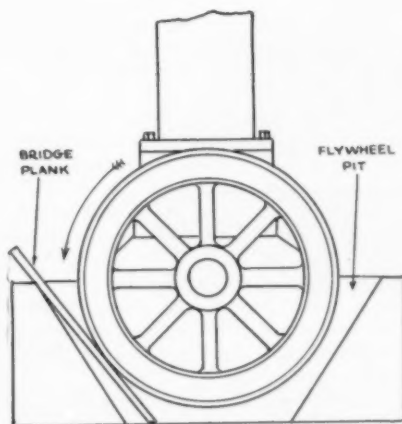
ping by placing a board under it.

3. The third suggestion has to do with the same subject but offers another idea along the same line, and which is a little more simple. Secure a piston ring and place a piece of heavy canvas over it stretching it tightly much in the same manner as a drum head. Insert this ring into the liner from the bottom after the piston has been removed and it forms a catchall for foreign matter which might otherwise fall into the crankcase. This is not used when cleaning ports but is used when grinding off shoulders at the top of the piston stroke.

When the job of removing these shoulders has been completed and the ground surface polished up, this ring can be removed by pushing it up to the top of the liner and then removing same. The canvas thus wipes the liner wall and what little matter remains on the liner wall can be easily wiped off with an oiled rag.

When removing carbon from the ports a large piece of light sheet metal, conveniently cut to size is placed on the crosshead (on a crosshead type unit) and the slide is completely covered with a piece of canvas so that carbon will not drop on the slide surfaces. The carbon is then removed from the ports by means of a special scraper and caught in a pail held under the ports being cleaned. What little escapes the pail will be caught in the canvas and on the sheet metal and can be easily removed with a little care after the job of cleaning the ports is completed.

The above suggestion eliminates drawing off the crankcase oil and cleaning the crankcase.







# High-Speed Diesels ... Design, Operation & Maintenance

CONDUCTED BY H. G. SMITH

## Bearings and Their Lubrication

**A**N engineer who has made many contributions to the study of engine lubricating systems and oil filtering once said, "Give me good, clean kerosene and enough of it to keep the bearings cool and I will successfully lubricate any gasoline engine." He made this statement some twenty years ago, and, although he did not mean it literally, it did supply food for thought, because he stressed the point of temperature rather than the type of lubricant.

Volumes have been written on this subject and considerable progress has been made in the past 30 years but bearing failures still occur too frequently. Many authorities have expressed the opinion that the majority of these failures, regardless of size, load or speed, are the result of inadequate oil supply. This does not necessarily mean that the oil does not get to the bearing. It may get up but not into and through it. Sufficient supply can only be attained if the proper exit is provided.

Some experts say that a bearing is only as good as its oil supply. Not only must the oil separate the loaded surfaces, it must carry away the heat that is generated by the parts rubbing together and from the continuous working, stretching and shearing of the oil itself. The object of this discussion is to point out the seriousness of not getting the oil through a bearing.

In most of the present multiple cylinder engines one of the problems is not only "putting" sufficient oil into the bearing but "letting" it get out properly. Sleeve bearings are much more susceptible to failure due to heat than ball or roller type, but none of them are very happy if they

H. G. Smith's background in diesel engineering renders his articles of great interest to those engaged in operation and maintenance of high-speed engines. From the Springfield, Ohio, Technical and Engineering School, he entered the Foss Gas Engine Company, Springfield and later, Springfield Motor Truck. With this experience behind him, he joined Hercules Motors Corporation where he was chief engineer for many years being with them when their diesel program was started. Executive engineer for Buda during the last ten years, he recently resigned to take up consulting work.



are subjected to excessive heat. The lubricating systems of many machines and internal combustion engines are designed and redesigned to get oil to arrive at a particular point but little attention is paid to the exit. The oil has completed only one third of its duty when under pressure or gravity it arrives at its destination. It must lubricate and finally "escape" with its pack of heat it has picked up.

An example of what escape means was a case of center bearing failure in a medium large diesel engine. The engine was a six cylinder vertical type and had seven main bearings and rates at 300 horsepower.

It was originally designed to produce approximately 200 hp. The designer did not provide a

very liberal center main bearing and since all in-line six cylinder engines have the third and fourth crank throws in line with each other, the center bearing has greater inertia forces imposed upon it than any of the others and consequently should be the longest. In this engine the center bearing was the same length and diameter as the intermediate bearings, this being done to reduce the engine cost. Three pairs of identical cylinder heads were used as the result of this arrangement. The engine proved to be quite successful for several years, no changes except minor ones were made during this period.

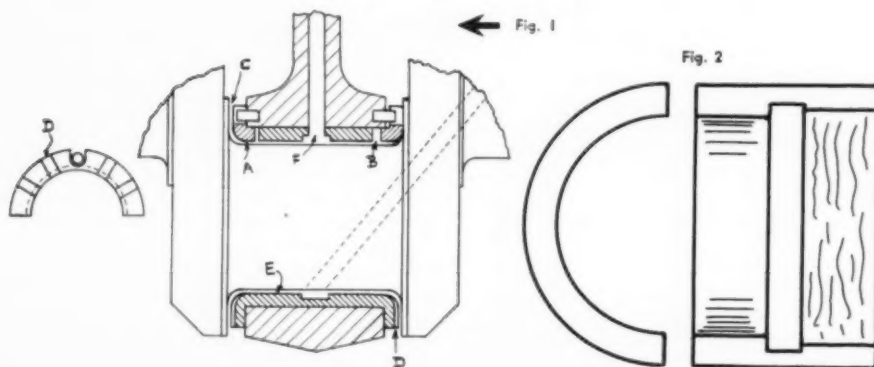
It was decided to increase the output by enlarging the bore and increasing the speed. The engine performed very satisfactorily and passed through extensive laboratory tests.

One of the first installations was made in a diesel-electric switching locomotive. This required a direct drive between the engine and the generator. This hook-up changed the elastic system to the extent that some bad torsionals were introduced. Complete and exhaustive calculations were made and it was found necessary to increase the diameter of the main as well as the crank journals of the engine crankshaft. The cheeks of the shaft also had to be strengthened and to obtain sufficient stiffness the thickness was increased and the main journals were shortened.

The bearings were changed to suit the new shaft size and the design of the center bearing was changed from integral end thrust flanges to a separate type, this being due to the bearing manufacturer being unable to obtain proper thick-wall tubing which is required to make the integral flange type bearing. This change in design later proved to be the cause of the failure.

The separate thrust flange design was not new, being used by many engine manufacturers, but as will be pointed out later the design must incorporate certain features. Failures started to occur immediately. They became so serious that production was stopped. It was first thought that the failure could be caused by a change being made in suppliers but chemical and microphotos did not reveal any variations from specifications. The usual recheck of bearing loads was made but the calculations still did not show any excessive loading on the engine.

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# 21st ANNUAL O. G. P. CONFERENCE

## FEATURES MANY INTERESTING EXHIBITS

By ALFRED A. DEICICCO

**T**HE 21st annual conference and exhibit of the A.S.M.E. Oil and Gas Power Division, in co-operation with the Railroad Division, was held April 25-29, 1949, at the Hotel Sherman in Chicago. Attractive displays of each exhibitor represented well over a quarter of a million dollars. The conference week was highlighted with interesting tours to the Chicago Northwestern Railroad shops, the Electro-Motive, and the Fairbanks-Morse plants, and informative lectures given by men prominent in the field. The attendance roster, totalling over 450, included many names that are eminent in the oil and gas engine industry, plus leading accessory manufacturers who have contributed largely to the huge expansion of our field.

One of the products drawing much attention was a full-size working model of the Cycoil Oil bath air cleaner and intake silencer exhibited by the American Air Filter Company. The operation of the Cycoil is unique in that the air in passing through picks up a quantity of oil, which is thoroughly mixed with the air by causing it to impinge against oil-coated surfaces. Most of the oil picked up is then thrown out at the top of the inner cylinder by centrifugal action, and over 90% of the total dust content of the air is thrown out with this oil. The remaining dust, plus a small amount of oil, then passes to the filter cell where it is also removed. The net result is practically 100% efficiency in dust removal, positive oil circulation, and large dust holding capacity. A full-size working model of an automatic self-cleaning air filter was also shown. C. C. Sowerby, Sales Manager, D. M. McMakin, Assistant Sales Manager, and A. C. Cunningham, engineer, were present at the exhibit.

In the largest of the fuel injection exhibits American-Bosch displayed typical units from its broad lines of injection pumps, including the large "F" size, also spray nozzles, filters, magnetos, generators, regulators, and electrical windshield wipers. In general charge was Frank Oberle, Manager of the Central Division, who was assisted by Messrs. Bates, Langkin, and Parker of his staff. Other branch managers present were Messrs. Collins (Cleveland), Johnson (N.Y.), and Von Merrens (Detroit). From the Springfield, Massachusetts factory came Foster Perry, Vice President (Sales), Hans Hogerman, Chief Engineer (Fuel Injection), and Henry Ortnier, Chief Instructor of the American Bosch Service Training Schools.

The Air Maze Corporation had its complete line of oil bath type air filters for air intake of engines, compressors, and pressure blowers. These air filters are available in capacities up to 6500 c.f.m. The types range from bottom and top outlets, relief valves, and backfire valves. Another bottom outlet type filter is made for larger application and mounts directly on air intake pipe, while still another top outlet filter is made for large applications where head room is limited. The filter is suspended from intake pipe. W. B. Watterson, Sales Manager, was in charge of exhibit and N. L. Lamprecht, Assistant Sales Manager, attended the show.

Synchro-Start Products, Incorporated were on hand with an attractive display featuring their automatic starting and stopping engine controls. These controls are developed to accomplish desired results in a practical and dependable manner, and have been proven through actual service in the field over a period of years. In application for diesel engines, a complete line of automatic controls are available for throttle, starting motor cutout,

air starting engines, power failure starting manual stop, automatic temperature controls, safety stop control sets, and over speed governors. Along with the manufacturing of these controls various solenoids, relays, and multiple engine control panels are produced. Technical explanations were given by W. J. Williams, President, C. A. Genske, Vice President and Sales Manager, and W. L. Stelter, Chief Engineer.

In charge of the Wm. W. Nugent & Company exhibit, featuring lubrication devices—oil filters, was F. L. Townsend, Sales Manager of the company. Displayed was an arrangement of their four cartridge filter which is made in larger sizes containing seven and twelve cartridges. On a panel, used as a backdrop, various compression pipe fittings were shown with sizes ranging from  $\frac{1}{8}$  of an inch to  $\frac{3}{4}$  of an inch I.P. Any reduction or combination of reductions may be had in these compression pipe fittings. Also shown were two pressure type oil filters (bag type and absorbent type). The bag type pressure filters are made in 7 sizes to 10,000 gallons per hour capacity. The absorbent type filters are made in 11 sizes for filtering liquids to 1197 gallons per minute, depending upon viscosity. Assisting F. L. Townsend at the booth was J. Vocelka.

The Tuthill Pump Company featured primarily its line of fuel transfer pumps for diesel locomotives, and automatic service pumps. The two new pumps, model No. 7 and 8 are adaptable to marine service. No. 7 is suited for 100 gpm. at 100 psi., while the No. 8 is suited for 200 gpm. at 100 psi. Tuthill also introduced its CB line of pumps which are self-adjusting to compensate for wear. The series S and SA are made for capacities to 200 gpm.; Model L pumps which supplement the Model CK series offer capacities up to 200 gpm.; the small industrial pumps from  $\frac{1}{8}$  to 3 gpm.; Model RC and RM automatic reversing pumps reach capacities up to 50 gpm. in six sizes. In charge of the booth was W. J. Wagner, Assistant to President, giving explanations of their pumps as was H. T. Kessler, Vice President and General Manager, and E. C. Chapman, Chief Engineer.

Featured at the Scintilla Magneto Division of the Bendix Aviation Corporation exhibit was its line of fuel injection equipment, small industrial magnetos, and other electrical products. Emphasis was put upon their new H-1 magneto, which is designed for use on small and intermediate size, one-cylinder engines. This magneto is also a battery timer for ordnance engines, has a built-in coil, and automatic advance. The H-1's built-in coil is of molded construction, completely sealed, waterproof and dustproof, and is unaffected by vibration. A. J. Poole, Jr., Sales Engineer, was in charge of the booth, and L. O. Mjolsnes, and M. E. Douglas, sales engineers, were on hand at the exhibit.

In charge of the Continental Air Filter's booth, featuring their Whirlwind Oil Bath Air Cleaner and the Continental Automatic Self-Cleaning Air Filter, was Wm. K. Gregory, President of the organization. The outstanding features of the Whirlwind Cleaner are visual oil circulation, adjustable oil level regulator, positive scrubbing action, demountable construction, center tube inlet, and side outlet. Their new automatic self-cleaning air filter embodies three features. The first is the filter media consisting of aluminum strips with double compound corrugations, forming honeycomb openings with large, non-clogging

air passages. The second feature is, as the filter cells move up and across the top of the filter, they are free to rotate around an axis. The third feature is the positive self-cleaning action. R. K. Waters, Chief Engineer, was in attendance at the booth.

The direct application of plating on aluminum for cylinders and liners was exhibited by the Van Der Horst Corporation of America. The redesign of a small, 2-cycle, single-cylinder engine from cast iron to aluminum, with the cylinder plated by Porus-Krome process, resulted in weight reduction from 7.5 pounds for cast iron to 4.75 pounds for aluminum. A saving of over 63% in the cylinder alone. This proven example was explained by R. Pyles, Chief Engineer, at the show. In attendance at the booth was H. Van Der Horst, President, K. L. Van Der Horst, Vice President, W. J. Fritton, Assistant Sales Manager, and J. A. Andrisek, sales.

The Alnor 1160, combination pyrometer and motor driven switch was featured in the Illinois Testing Laboratories' exhibit. The style of assembly in this pyrometer is that telephone type relay contacts are closed by action of a motor driven roller arm. The contact leaves are mounted radially on a machined aluminum ring. Small cylindrical plungers, distributed around a central circle in the ring, are placed so that they can slide through holes in the ring and thus close the contacts. A roller carried on the outer end of the roller arm passes upon each plunger and moves it against the contact leaves causing the contacts to close. Latest addition to the "Alnor" line is the Excess Temperature Cutout. With it connected to the Type 1160, any diesel engine cylinder reaching an excessive exhaust temperature will cause the cutout to activate various alarm systems or engine shutdown controls. Technical explanations were given by M. J. Rauscher, Vice President in charge of sales, W. J. Bailey, Sales Manager, and Messrs. M. D. Carlson and J. S. Massie, sales engineers.

The Fram Corporation had on display their complete line of filters and liquid separators. A working model of their liquid separator was shown, and it was stressed that this separator can be used as a filter also. Fram has multiple cartridge filters for diesel engines up to 2000 horse power. E. L. Sandberg, Sales Manager, attended the show along with J. Rowe, District Manager, and W. L. Oberlin, Industrial Engineer.

A prominent display at the show was the De Laval "Puri-Filter" Combination manufactured by the De Laval Separator Company. This filter purifies diesel lubricating oil by a combination of a De Laval "Uni-Matic" continuous centrifugal, complete with dirty- and clean-oil pumps, with 3, 4, 6, or 8 Fram "Fileron" filters. A thermostatically controlled non-carbonizing heater and all necessary inter-connecting piping and wiring are furnished. To place the "Puri-Filter" in operation, it is only necessary to make connections to the oil sump and to the power supply. D. A. Gardner, Industrial Manager, K. D. Reed, Sales Engineer (N.Y.), W. C. Porch, Sales Engineer, and P. A. Conrod, Sales Engineer, were in attendance at the De Laval exhibit.

American hammered piston rings, manufactured by the Koppers Company, Inc., Piston Ring Dept., were displayed in one of the more attractive exhibits. Featured were the K-span and porous chrome plated rings, claimed by the manufacturer . . . and now please turn to page 56 . . .





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to have greater tensile strength and elasticity and long life. J. A. Worthington, Sales Manager, was in charge of booth.

The central feature of the Diamond Chain Company exhibit was an operating model of a two-cycle advance and retard mechanism for direct reversing engines. This cam shaft timing device is one of many applications for the Diamond Chain in the diesel field. Other applications are fuel injection pump drives, water pump and lubricating oil pump drives, generator drives, exciter drives, governor drives, air compressor drives, tachometer drives, supercharging blower drives, and power take-off drives. Giving first-hand information on the use of Diamond Chain was R. A. Shakel, manager of the engine drive department.

The Burgess-Manning Company exhibited engine silencing equipment that has been supplied to the internal combustion engine trade for years. Its line consists of terminal exhaust snubbers, industrial spark arrester snubbers, marine spark arrester snubbers, industrial air intake snubbers, combination intake air cleaner-snubbers, manifold type. Each one of the mentioned snubbers comes in various sizes to meet any demand of the buyer. Information concerning Burgess-Manning products was supplied by H. A. Deitrich, Sales Manager of the railroad division, D. W. Day, Vice President, S. G. Padlock, Sales Manager petroleum division, A. C. Kelley and F. C. Duerr, representatives.

The National Bearing Division of the American Brake Shoe Company exhibited bronze diesel engine bearings and castings. Explanations of these products in their application to the diesel industry was given by booth personnel that consisted of I. E. Cox, Vice President, R. Hessler, Assistant to Vice President, B. J. Esarey, Chief Engineer, and sales representatives P. Bauman and W. Wallace.

Long-time manufacturers of precision piston rings and piston ring tools and accessories, the Wilkening Manufacturing Company had an impressive display. Some of the Pedrick firsts in their piston rings are 1) heat-shaping—for lasting tension equally distributed, 2) thermo-curing—for circularity, 3) double-disk grinding—for flatter

ring and better seal, 4) silcoating—for fast, safe seating. A feature at this booth was the new chrome piston ring that is centrifugally cast and the metal then is heat-treated in multiple stages in special molten salt solutions, operating under automatic control. All these piston rings have a wide use in marine and auxiliary diesel engines. R. P. Magarigal, Sales Manager of the industrial division was in charge of the booth, and explanations about the products were given by H. G. Braendle, Chief Engineer, C. A. Brown and W. R. Maxwell, both sales representatives.

The U. S. Hoffman Machinery Corporation, Filtration Division, makers of cartridge filters, disc type filters, and oil purification equipment, included in their exhibit the new Hoffman cartridge filter. This new filter has a unique cover-lifting device which enables interior inspection with ease. The Hoffman Cartridge Filter, operating on a by-pass principle, may be directly connected to the lubricating system for continuous or intermittent filtering. Repackable or throw-away type cartridges utilizing Fuller's earth, cellulose or waste matter are available. The new series of Hoffman Filters are available in cartridge multiples of 1, 2, 3, 4, 6, and 8. Charles I. Wallace, Division Manager, was in charge of booth and he had the help of A. S. Allen, District Manager, and representatives from the midwestern area.

The Nathan Manufacturing Company exhibited their line of lubricating devices and lubrication methods pertaining both to industrial and railroad applications. The booth personnel consisted of W. E. Wollheim, Manager of the industrial division, R. H. Nathan, Vice President of Nathan, F. Smith, Western General Manager, and C. F. Erickson, Chief Engineer.

Featured in the line of hydraulic governors for internal combustion engines by the Woodward Governor Company, was their electro-hydraulic governor for diesel locomotive service. This cut-away model showed the complete working conditions of the governor. Also in the display, smaller cut-away models were exhibited and explained by D. Carncross, Control Engineer, N. Noling, Advertising Manager, R. Kjellgren, Assistant Advertising Manager, and G. Parker.

The Hilliard Corporation featured Hilliard-Hilco lubricating and fuel oil maintenance equipment at the show. Prominently displayed at the front of the booth was their oil reclaimer with four new features 1) rotary pump, 2) flow control valve on inlet, 3) heat exchanger which allows higher regenerative capacity, and 4) larger lube oil sump. T. A. LaBrecque, Manager of oil purifier division, was in charge of the booth. Also present were E. A. Mooers, President, K. T. Smith, Jr., Service Engineer, and F. M. Steele, Research Engineer.

Highlighting the exhibit of the Scaled Power Corporation, manufacturer of pistons and piston rings, was their new Cyclan iron piston ring that was developed for heavy duty diesel engines. This product is resistant to property changes under operating conditions. Indentation on the outer edges of the ring is filled with graphite and it comes in sizes ranging from two inches to thirty-eight inches. Also shown were sleeves and pistons up to nine inches. G. W. Davies, General Manager, R. A. Snyder, Sales Manager or ring division, Stuart Nixon, Research Engineer, R. B. Hawkins, Sales Engineer, L. W. Kibby, Product Engineer, R. W. Wood, Sales Division, and A. W. Lines, Sales Manager of piston and sleeve division, were at the booth during the show.

A fuel line of filters for diesel tank and lubricating oils for engine attachment and bulk clarification was displayed by the Commercial Filters Corporation. The Fulflo filters have capacities ranging from 20 gpm. to 80 gpm. High capacity models for bulk filtration use from 22 to 142 genuine honeycomb filter tubes in parallel with capacities ranging from 8500 gph. to 55400 gph. R. L. Fielding, Vice President in charge of sales, was in attendance at the booth along with E. W. Dumler, assistant to Vice President, and L. R. Chisholm, Sales Engineer.

Klipfel Manufacturing Company displayed various types of valves which included back pressure and relief valves, reducing valves, thermostatic valves, and diaphragm valves. Emphasis was put upon their No. 135 back pressure valve which provides close regulation for up to four times normal pipe capacity. This valve serves as two functions: 1) limits pressure on pump and 2) there

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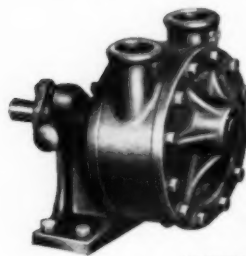
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is uniform oil pressure on bearings. Technical explanations were given by E. T. McCarthy, Chief Engineer, and F. H. Breor, Sales Manager.

A complete line of bearings, thrust bearings, and bushings were displayed by the Cleveland Graphite Bronze Company. All sizes and styles of bearings and bushings are applicable for the diesel stationary and marine engine as well as the automotive and aviation industries. Bushing wall thickness ranges from 1/32 of an inch to 1/16 of an inch and can be made heavier if needed. Thrust bearings (washers) can be furnished plain, ball indented, or with rectangular indents filled with graphite. The heavy-wall bearings, which are used for diesel and high-duty applications, are suitable bearing material when loads over 1200 psi. must be carried. Descriptions and uses of products were given by L. W. Christenson, Vice President in charge of sales, A. E. Gibbs, Chicago Sales Manager, E. Crankshaw, Chief Engineer, L. Pisek, Field Engineer and sales representatives.

Vapor Blast had on display various samples of surface preparation work of liquid honed engine parts. In a diesel type sleeve that has been Porus-Chromed for hardness, it has been found that normal honing operations have a tendency to close up the secondary channels. Liquid honing not only opens up these secondary channels thereby increasing surface area, but also increases the porosity by removing electrolytic debris and other foreign matter which has been worked into the metal by conventional honing methods. Booth personnel consisted of A. H. Eppler, President, V. W. Nichols, Sales Manager, W. C. Houston, Assistant Sales Manager, and Messrs G. H. Lieser, C. Offen, S. F. Scott, sales representatives.

The International Nickel Company exhibited but a few of the numerous uses of nickel alloy applications in diesel engine construction. Practically every part of the diesel engine has nickel alloy content and it would be impossible to list all its uses. Attending the exhibit were H. S. Lewis, charge of publicity, J. W. Crossett, charge of railroad development, and Messrs. J. S. Vanick, R. F. Thomson, H. L. Geiger, H. M. Northrop, metallurgists of the company.

Manufacturers of fuel injection equipment, Diesel Engineering and Manufacturing Corporation had an interesting display. Their line of equipment consists of multiple-unit fuel injection pumps, individual unit fuel injection pumps, nozzle holder assemblies, nozzles, and fuel injection equipment. Seen at the display were N. Fodor, President, H. O. Hill, Sales Manager, and P. Carlson, Field Engineer.

Aluminum bearings, tubings, fittings, forgings, and diesel blocks were exhibited by the Aluminum Corporation of America at the show. Attractive photographs showed the application of aluminum in the diesel industry particularly in the railroad segment. In charge of the booth was P. B. Jackson, assisted by R. L. Pearse, Division Engineer, R. F. Schaefer and D. B. Wood, both development engineers.

#### A New Mechanical Hour Recorder



**T**HE Barbour Stockwell Company is now manufacturing the Reliance Hourmaster which records the number of hours any piece of machinery, or equipment with moving parts, has been operated. The

Hourmaster converts revolutions per minute, from 1 to 4,000 into hours of operation. Space is provided for record cards which can be used to accumulate service, production or maintenance records. Each instrument adds up to 100,000 hours of operation and requires practically no service or maintenance.

*You'll get better filtering  
at lower cost . . .*



## with NUGENT NUPACK Graduated Density Oil Filter Recharges

Genuine Nugent Nupack replacement cartridges assure you of the dependable, troublefree service which your Nugent filters were built to give. Comparative tests of genuine Nugent recharges and imitations have proven that Nugent recharges last up to twice as long and absorb up to eight times the carbon, grit, etc., providing cleaner, safer fuel or lube oil all the time.

Nugent Nupack Recharges are cellulose filter elements, graduated in density so that dirty oil passes through progressively finer fibre structures until at the center of the recharge, dirt and carbon particles as small as a few microns are removed. Uniform dirt loading means maximum life and maximum efficiency from the unit.

Nugent Nupack Recharges are sized to fit existing Nugent filter shells. For complete information and prices send us the figure number and sizes of your Nugent Filters.



*Established  
1897*

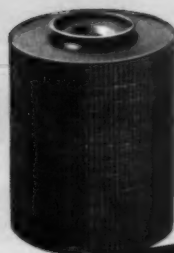
**Wm. W. Nugent & Co., Inc.**  
415 N. Hermitage Ave. CHICAGO 22, ILLINOIS

**OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS,  
OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS**  
Representatives in Boston • Cincinnati • Detroit • Houston • La Jolla, Calif. • Los Angeles  
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# Dirt-Proof

Your Fuel Oil and Lube Oil with  
**AC Filter Elements**



**FOR FUEL FILTERS**

Millions of hours of service stand behind the AC Quality Elements engineered for Diesel fuel filters. For their full life, these precision-built elements actually "Dirt-Proof" the fuel. As protection for fuel injectors and transfer pumps, AC Elements are unequalled. Yet their cost is little, if any, greater.



**FOR LUBE OIL FILTERS**

AC also builds a full line of elements for nearly every make of lubricating oil filter—elements so efficient that they "Dirt-Proof" lube oil. Each element is precisely engineered for the job it is to do, and the filter it is to fit. Each gives the longest protection consistent with maximum filtering efficiency.

## Complete Filters and Strainers for both Fuel and Lube Oil

For the fuel system, AC Strainers and Filters are made to serve engines up to 500 hp.—intermittent or continuous operation.

For the lubrication system, AC Oil Filters are available for engines up to 1800 cubic inch displacement.

AC SPARK PLUG DIVISION •

**AC**  
**OIL FILTERS**

GENERAL MOTORS CORPORATION



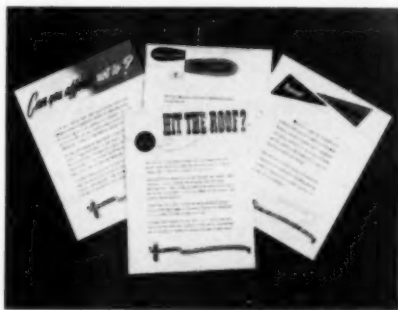
### F. W. Bremmer Elected Vice President of National Supply



F. W. Bremmer

**T**HE National Supply Company has announced the election of F. W. Bremmer as Vice President in charge of manufacturing to fill the vacancy occasioned by the retirement of Charles R. Barton a year ago. Works Manager of the Spang-Challant Division Plant at Ambridge since 1948, Bremmer, a graduate Metallurgical Engineer from Carnegie Institute of Technology in 1924, rose from Hot Mill Foreman to Plant Metallurgist at the Seamless Tube Company, Ambridge, Pa., and shortly after Spang-Challant acquired the company, he became Assistant Superintendent of Hot Mills. He became Works Manager of Spang-Challant Division at their Etna, Pa., plant in 1940 the company having been acquired by the National Supply in 1930. He held this post until his appointment as Works Manager at Ambridge last year.

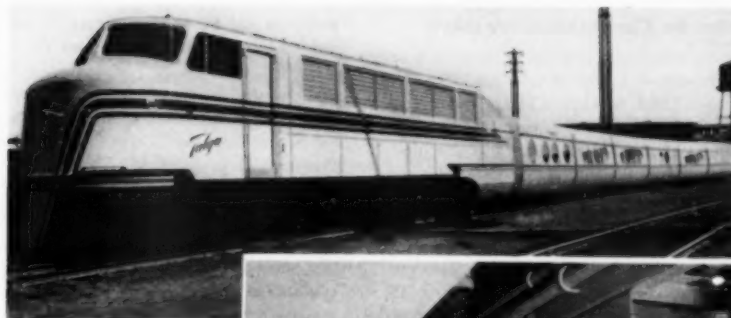
### Honan-Crane Issues New Booklets



**A** SET of four two color booklets published by Honan-Crane Corporation gives the complete story on the value of filtering oils and coolants used in metal working operations such as, cutting, grinding, boring, honing, quenching, etc. The four booklets discuss:

1. The tremendous dollar savings in man hours, lower operating costs and higher production.
2. How to solve problems of dermatitis, excessive rejects, coolant disposal, machine downtime.
3. How to do it—the right method and equipment to handle any problem from 1 to 500 machine tools.

This set of booklets is available by writing Honan-Crane Corp., 201 Indianapolis Ave., Lebanon, Indiana.



How the designers of the new A.C.F. Talgo stopped vibration!

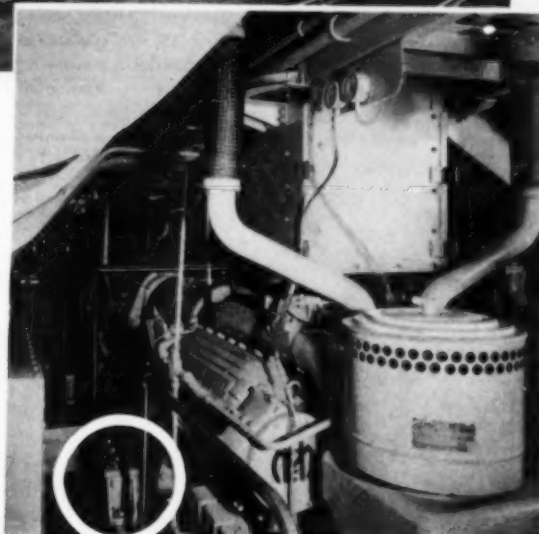


Photo Courtesy A.C.F. Co.

**T**HE FIRST TRAIN ever to be built in America based on the Spanish "Patentes Talgo" has been completed by ACF for testing and demonstration. The "ACF-Talgo" train represents entirely different concepts in railroad construction. When it is considered that weight reduction is an important feature of this train and that a gross weight of 140 tons does the same work as an average of 550 tons of conventional construction, the necessity for effective, resilient suspension of the power units becomes obvious. Both of the main propulsion Diesel generators and the two auxiliaries are isolated or resiliently separated from the locomotive structure by rubber-in-shear Vibration Eliminators. There are four of these for each engine and they are probably the largest and most complex mountings ever used in a locomotive.

There are two 12" channels spaced 42" apart from the center sills of the locomotive. This exceptionally wide spacing permits the main propulsion engines to be hung between the channels as close to the rails as possible and to facilitate lowering of the

Diesels into a pit for replacement with a spare without interfering with the scheduled runs. Such problems as light construction, precarious engine suspension and rapid availability necessitated extensive design of the engine mountings. The mountings had to allow complete freedom in all directions commensurate with the disturbing frequencies and yet limit all movement with perfect security under the extremes of road service or failure of these resilient components.

The engineers of the Vibration Eliminator Company are particularly capable of handling problems such as the isolation of the "ACF-Talgo" Diesels. Much of their more important design work has been in the mobile equipment field. It is this solution of the "unusual" problem that assures you of the best for the "standard" installation.



**THE VIBRATION ELIMINATOR CO., 10-28 47th Ave., Long Island City 1, N.Y.**



### Articles On Chromate Corrosion

**M**UTUAL Chemical Company of America is offering a reprint of a series of four articles written by Mutual's Chief Research Chemist, Marc Darin. The 16-page pamphlet is entitled "Corrosion Inhibition with Chromate." Part I is the introduction and gives general data on chromates and bichromates; discusses bimetallic corrosion, aeration, effect of relative humidity, inhibitive paints and other applications. Part II is devoted to chromate corrosion inhibition in drilling, oil production, and gas condensate wells. Part III covers corrosion problems in Gas-Processing Plants and Refineries; while Part IV takes up Corrosion

Problems in Pipe-Line Systems, Tankers, and Petroleum Distribution Equipment.

Write to the Mutual Chemical Company of America, 270 Madison Avenue, New York, New York, for a free copy of "Corrosion Inhibition with Chromate."

### D.E.M.A. Fall Educational Program

**T**HE Diesel Engine Manufacturers Association has plans already set up for next fall for their educational program of cooperation with the engineering colleges and universities of the country. Starting off the fall program will be a full week's

diesel symposium at Madison, Wisconsin, the week of August 29, under the sponsorship of the University of Wisconsin and the Diesel Engine Manufacturers Association. It is expected that approximately 100 professors from the engineering schools throughout the United States, and 50 engineers from the diesel engine industry will attend this symposium.

Supplementing and following this intensive week will be a series of four meetings of one day each in different regions of the country, where professors will visit plants where diesel engine products are made and listen to diesel engineers talk about subjects of practical interest to educators teaching in the diesel engine field.

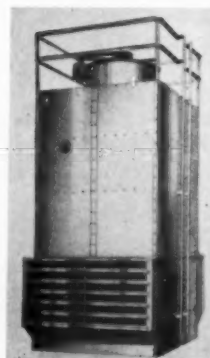
The first of these meetings will be on Tuesday, October 18, at the Springfield, Massachusetts plant of American Bosch Corporation.

The second one will be at the Illinois Institute of Technology in Chicago, with the day's program being sponsored by Illinois Testing Laboratories, Inc., Burgess-Manning Company, William W. Nugent & Co., Inc., DeLuxe Products Corporation, The Standard Oil of Indiana, and Diesel Engineering & Manufacturing Corporation.

The third day's program will be in Cleveland, Ohio, at the Cleveland Diesel Engine Division plant of General Motors Corporation. Cooperating with General Motors Corporation in presenting this program will be Air-Maze Corporation and the Cleveland Graphite Bronze Company.

The fourth conference will be at the University of Denver and will be attended by representatives from the mountain-state schools and engineers from the diesel engine industry.

### New Cooling Tower



ing design previously found only in heavy duty industrial, high-priced towers.

Some of Verflow's features are these: Lifetime nail-less filling, easy to remove and re-install spray system with Marley patented low pressure nozzles; access port to inspect and clean nozzles; totally enclosed motor; enclosed bearing housing with grease-packed bearings; Marley air-foil section cast aluminum alloy fans, multiple-celled units if desired; special corrosion-resistant paint on metal towers; heavy double-sheathed wood casing on wood towers; hinged louver frames and removable louvers; complete basin fixtures.



**COSTLY SCRAP--  
OR**

**SERVICEABLE  
PARTS?**

Many heavy and bulky parts can be repaired **ON LOCATION** by our especially developed machines, methods and skilled personnel—thus effecting great savings in time, dismantling and transportation costs.

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"KEEPING PACE WITH DIESEL PROGRESS"

**WASHINGTON IRON WORKS, Inc.**

Established 1876

**SHERMAN, TEXAS**



# STANDARD ENGINEER'S REPORT



## NEW LUBRICATING OIL

### STOPS ALL RING STICKING WHERE ORDINARY OIL FAILED

Specially Developed RPM DELO Supercharged Oil Solves Extra Tough Load and Carbon Problems



AFTER ONLY 625 HOURS operation on an ordinary heavy-duty type oil, an engine pulling 90% of full load rating had 39 stuck rings — only 9 of its 48 rings were free and several were broken. There were heavy lacquer and carbon deposits in ring grooves and on piston-skirts, as indicated by this unretouched photograph of one of the pistons. Besides stuck rings, note clogged oil-return holes and oil rings.



OPERATED 1582 HOURS — more than twice as long — on RPM DELO Supercharged Lubricating Oil, the same engine, running under the same load and fuel conditions, stayed efficient and clean, as this unretouched photograph shows. At the end of test all 48 rings were free, there were no piston-skirt deposits, ring-groove deposits were 50% less. Note how RPM DELO Supercharged kept oil-return holes open.

**REMARKS:** RPM DELO Supercharged Lubricating Oil is a new product added to our line. It solves operating problems in both Diesel and gasoline engines, especially where load conditions are extreme.

Its detergent prevents carbon and lacquer deposits on all parts, even with high sulphur-content fuels.

RPM DELO Supercharged Oil sticks on hot and cold surfaces — reduces wear under the heaviest loads. (Cylinder-wear averaged only 0.0014 inches per 1000 hours with RPM DELO Supercharged, while with the ordinary oil it was 0.0043 inches — three times greater.) RPM DELO Supercharged Lubricating Oil also contains special compounds that resist oxidation and sludging, prevent bearing corrosion and internal rusting, and stop foaming.

**STANDARD TECHNICAL SERVICE:** checked and reported this test. If you have a lubrication or fuel problem your Standard Fuel and Lubricant Engineer or Representative will give you expert help; or write Standard of California, 225 Bush Street, San Francisco 20.

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco  
THE CALIFORNIA OIL COMPANY • Barber, N. J., Chicago

STANDARD OIL COMPANY OF TEXAS • El Paso, Texas  
THE CALIFORNIA COMPANY • Denver, Colorado

## TEST DATA

LUBRICANT *RPM DeLo Supercharged Lubricating Oil*  
UNIT *Caterpillar Diesel - D-17000-V8 Cyl.*  
CONDITIONS *Cont. High Load - Actual field oper.*  
FUEL *Commercially available Diesel Fuel*  
TEST PERIOD *4 months*  
FIRM *Homer Jones Ranch, Chandler, Ariz.*



### Tuna Clipper "Conqueror"

THE tuna clipper "Conqueror" was described in the February 1949 issue of DIESEL PROGRESS with one regrettable oversight. We neglected to give credit to Wilvers & De Fever, marine surveyors and naval architects of San Pedro, Calif., as the designers of this interesting vessel.

### Power Test Codes 1949 For Internal-Combustion Engines

THE American Society of Mechanical Engineers, 29 West 39th Street, New York 18, N. Y., now has available the 1949 Power Test Codes for Internal-Combustion Engines, a 50-page booklet embodying an entirely new version of the code. The arrangement which follows the new standard form for

ASME power test codes, includes rules for testing, methods for instrumentation and procedures for evaluating results, revised to conform with current requirements for determining the performances of all types of modern reciprocating internal-combustion engines. This very complete work on engine testing procedure is available from the American Society of Mechanical Engineers, Publication Sales Division, at \$1.50 per copy.

### Bibliography on Sprays

UNDER the joint sponsorship of the United States Navy and the Texas Company, a comprehensive and descriptive listing of more than 900 published works on fuel sprays, industrial sprays and many closely related problems, has been

issued by Professor K. J. DeJuhasz of Pennsylvania State College. Both English language and foreign works are included.

It is felt that this should be of great help to design and production engineers especially those working in the diesel and gas turbine fields. Copies may be obtained from The Texas Company, Refining Department, Technical and Research Division, 135 East 42nd Street, New York. Comments or additions will be appreciated as it is planned to re-issue this bibliography from time to time.

### John S. Barnes Corp. Announces New Line of Pumps

Designed particularly for use on farm tractors, power units, truck applications, and material handling equipment, the John S. Barnes Corporation has announced the addition of a line of high pressure pumps to its already well known line of Constant-Flo Rotary Gear Pumps. This new line of high pressure gear pumps maintains satisfactory continuous pressure up to 1000 psi., and intermittent pressure up to 1500 psi. The pumps throughout maintain the same mounting dimensions as the standard low pressure models. Unique features of these new high pressure pumps are: (1) pumps embody anti-friction bearing design; and (2) mechanical and volumetric efficiency are extremely high.

Catalog sheets giving complete engineering data will be sent upon request to John S. Barnes Co., 301 S. Water Street, Rockford, Ill.

### New Book

A NEW book entitled "CYLINDER WEAR IN DIESEL ENGINES" by Carl Hegh with a foreword by Jean Santschi, is an interesting and useful contribution to the technical literature of the diesel industry. The book is more especially written with regard to large marine diesels, and, apart from introductory chapters on the general subject, contains others on piston rings, lubrication, fuel oils—ignition and combustion, deposits and abrasives etc., etc. Well illustrated with clear figures and charts, this book correlates all available data on the subject and summarizes the proposals for reducing piston and cylinder wear. It should prove a good reference book for all diesel engineers or those engaged in the manufacture of diesel fuels and lubricants. Price \$5.00, published by the Chemical Publishing Company Inc., Brooklyn, N. Y.

### Correction

AMONG the "West Coast Diesel News" items published in the May issue of DIESEL PROGRESS, appeared one stating that a new 560 hp. Fairbanks-Morse diesel engine had been installed in the tuna clipper *Olympic* by Harbor Boat & Yacht Company, San Diego. It appears that our West Coast correspondent was misinformed and that the new engine installed in this tuna clipper is an 8 cylinder, turbocharged Enterprise diesel, rated 825 hp. at 400 rpm. The repowered *Olympic* completed her dock trial on Saturday, May 7. Our apologies to all concerned.

Learning Your Clutch Needs	Get More Horsepower Hours—with	Automotive and Aircraft
Analyzing the Problem		Trucks and Buses
Designing the Clutch		Tractors and Road Machines
Planning Production		Farm Machines and Implements
Tooling Up		Oil Field Rigs and Pumps
Manufacturing	ROCKFORD CLUTCHES	Industrial
Checking and Testing	<p>Because ROCKFORD CLUTCHES and POWER TAKE-OFFS are custom-engineered to fit each specific application — and because they are precision-made, carefully tested and accurately balanced, they deliver more horsepower-hours of reliable operation. Downtime, for adjustments, parts replacements or repairs, is reduced to the absolute minimum. If you are looking for a clutch that will — fit compactly into small space, deliver maximum torque, assure smooth engagement, soak up shock loads — or solve any one of dozens of other clutch problems, it will pay you to get in touch with our clutch engineering department. No obligation.</p>	Mowers and Light Machines
Supervising Installation		Engines and Marine Units
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		Production Units
	ROCKFORD CLUTCH DIVISION 8000 WARREN 1221 Eighteenth Street, Rockford, Illinois	REPOWER CLUTCHES POWER TAKE-OFFS



This is the Model DNX-V8DS Hercules 8 cylinder Diesel engine. It is one of the two supercharged propulsion engines installed in the "ACF-Talgo" train.



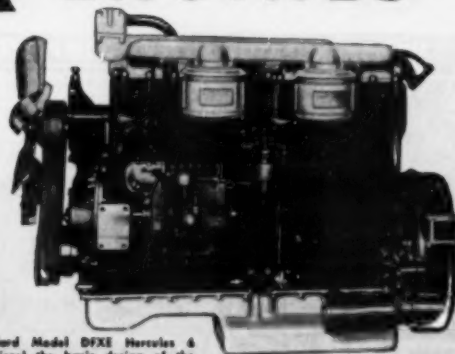
FOR THE "ACF-TALGO" TRAIN  
IS SUPPLIED BY

# POWER

## HERCULES DIESEL ENGINES

Two high speed, heavy duty Hercules Model DNX-V8DS eight cylinder supercharged Diesel engines of 1468 cubic inch displacement provide the power for operating the "ACF-Talgo" train. Each of these two engines are coupled directly to a propulsion generator which operates at a maximum of 400 horsepower at 1800 R.P.M. This speed is unusual for main line Diesel locomotives. Weight has also been reduced materially since the Hercules Model DNX-V8DS only weighs 13.6 lbs. per horsepower delivered to the generator.

Two Hercules Model DFXE six cylinder Diesel engines of 895 cubic inch displacement supply the auxiliary power for light, heat and air conditioning as well as operate the brake system. Each



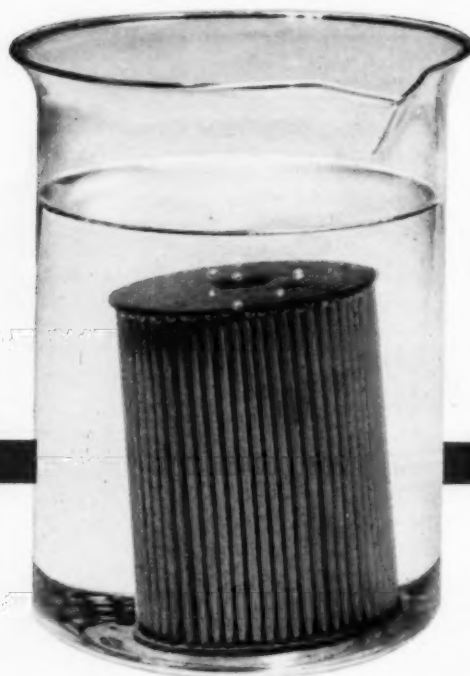
The standard Model DFXE Hercules 6 cylinder Diesel—the basic design of the auxiliary power engines.

engine drives a 100 KW alternator at a speed of 1500 R.P.M.

The fast, smooth operation and dependable performance of these Hercules Diesel engines have been well established in the test runs made by the revolutionary "ACF-Talgo" train.

**HERCULES MOTORS CORPORATION**  
CANTON, OHIO, U. S. A.

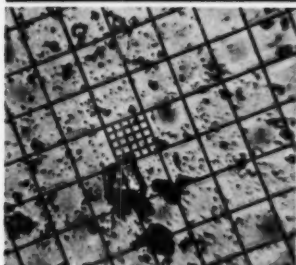




**Typical** Purolator Micronic Oil Filter element undergoing immersion test which proves its exceptional resistance to water.

Tests like this prove...  
**PUROLATOR** can't warp, distort, disintegrate!

**HERE'S WHY PUROLATOR FILTERS COMPLETELY!**



**Filters Micronic Particles.** In Government tests on oil filters, with approved Test Dust containing graded dust ranging from one micron on up, Purolator's specially designed Micronic element filtered 97.8% on the very first pass-through.



**5 Times Greater Filtering Area.** The revolutionary accordion-pleated design of the Purolator Micronic Filter provides an area 5 times that of old-style filters. This means a far greater dirt-holding capacity . . . a much longer filter life.

Put a Purolator Micronic Oil Filter element in a jar of water . . . let it stand for as long as 300 hours . . . *it will not warp, distort, or disintegrate!*

This is an extremely important Purolator advantage, since the oil in the average crankcase is frequently diluted with as much as 10% water. And as little as 5% water dilution causes many ordinary elements to swell up and practically shut off the oil-flow through the filter within three short hours.

Most important, Purolator assures *complete* filtration . . . so vital in *fuel* oil filtration because of the close tolerances of injector plungers, and the microscopic smallness of injector tip orifices. In *lubrication* oil filtration, too—Purolator's greater efficiency assures less wear on hard-working bearings.

We are anxious to *show* you how the Purolator Micronic Refill can lengthen the life of your Diesels and reduce maintenance costs . . . regardless of the type of engine or original filter unit. And our highly experienced engineering staff stands ready to help you with any special filtering problem you may encounter.



**PUROLATOR PRODUCTS INC.,**  
 Newark 2, New Jersey and Windsor, Ontario, Canada



# Aeroquip



## **FLEXIBLE HOSE LINES AND COUPLINGS DESIGNED TO SERVE THE DIESEL INDUSTRY**

You can improve your diesel engine performance with Aeroquip Flexible Hose Lines. Fire resistant, they operate at temperatures from  $-40^{\circ}$  to  $+275^{\circ}$  F with all types of diesel oils and fuels. They eliminate failures due to vibration and torque. Equipped with Aeroquip detachable and reusable fittings, they reduce operating costs to a minimum. Write or call for further details.

## **AEROQUIP CORPORATION**

JACKSON, MICHIGAN

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AND WAREHOUSES:	2912 N. E. 28TH ST., FORT WORTH 11, TEXAS	72-74 STAFFORD STREET, TORONTO, CANADA
SALES OFFICES:	303 WAREHAM BLDG., HAGERSTOWN, MD.	1419 2ND AVE., SO., MINNEAPOLIS 4, MINN.

**AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U. S. A. AND ABROAD**



### New Dynamometer at Railroad Fair

**F**AIR President, Major Lenox R. Lohr announced at Chicago that a railroad dynamometer car will be on display at the fair opening June 25. Its hydraulic system is so sensitive that the force exerted by a man pulling on the coupling may be measured. Newest device to measure the pull exerted by a locomotive against the resistance offered by a train, and jointly owned by the Illinois Central Railroad and the University of Illinois, the dynamometer car is so sturdily constructed that it has been used as a link between a locomotive and a 14,000-ton train of 213 loaded cars of coal.

### Correction

**I**N describing the diesel municipal power plant at Blooming Prairie, Minnesota, in the April issue of **DIESEL PROGRESS** we erroneously identified the engine exhaust silencer. The units illustrated in connection with the article should have been identified as Burgess Snubbers.

### Ten More Diesels Delivered To Chicago, Rock Island and Pacific Railroad

**C**ONTINUING expansion of its **ROCKET FREIGHT** service, Chicago, Rock Island and Pacific Railroad accepted delivery of ten diesel freight locomotives. These new units bring the

total number of diesels operating over the Rock Island's system (8,000 miles) to 189 of which 34 are assigned to **ROCKET FREIGHT SERVICE**, 35 to streamlined passenger service and 110 to switching and road switching assignments. Deliveries of ten 1500-hp. diesels for use on Chicago suburban runs are scheduled to begin mid-summer, officials of the railroad also announced. The locomotives now being delivered were built by Electro-Motive Division of General Motors.

### Re-refined Lubricating Oils Re-used in Diesel Engines



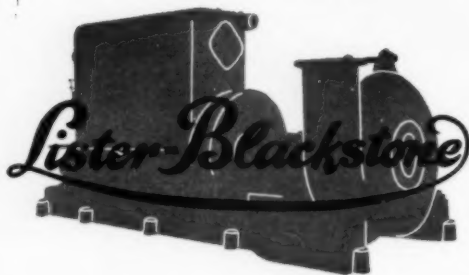
**O**PERATORS of stationary or mobile Diesel power units who use 50 to 75 or more gallons of lubricating oil weekly are offered an automatic machine for re-refining the oil after it has done a cycle of duty in the crankcase. The equipment manufactured by Automatic Oil Refiners, Inc., uses a catalytic process with high temperatures and sub-atmospheric pressures together with complete filtration. It performs a complete re-refining process on used lubricating oils, rendering them ready for re-use at quality levels equal to or better than the original oil, according to the manufacturer.

The Automatic Oil Refiner is 25" in diameter, 44" in height, and weighs 300 lbs. It can operate on 110 or 220 volts 60 or 25 cycles, single or 3-phase A.C. current. Its capacity is 3½ gallons at a time. The re-refining cycle varies according to the viscosity of the oil, but daily capacity of 100 gal. per 8-hour shift can be regarded as a reasonable average.

### Improved "Felseal" Has Wide Field of Applications

**"FELSEAL,"** product of Felt Products Manufacturing Company, Chicago, is a sealing material particularly developed for applications where high resistance to pressures, chemical action and heat are essentials. According to its makers, it not only meets severest service requirements, but it actually re-

*"The Diesels That ENDURE"*



**MARINE and INDUSTRIAL**

Medium Speed 3 to 320 H.P.

*Sold and Serviced in 37 Countries Throughout The World*

#### ★ DIESEL AUXILIARIES

Famed for years of pre-eminently economical and dependable performance for an extensive variety of stationary and marine auxiliary power and lighting requirements.

#### ★ MAIN POWER PLANTS

In suitable engine types and horsepower ranges to meet the ramified requirements of main-engine installations for:

Lighting Units, Power Plants, Oil Fields Pumping  
Irrigation, Refrigeration  
Fishing Vessels, Towboats, Harbor Work Boats, Ferries

*Write Us Your Requirements*

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420 Lexington Avenue, New York 17, N. Y.

Parts Warehouses: MILWAUKEE, Wis., 3073 S. Chase Street  
BOSTON, Mass., Whesco Building, Fish Pier

Agents: BOSTON, Diesel Engine Sales & Engineering Corp.; NEW YORK, Griffin Equipment Corp.; NORFOLK, Va., Curtis Marine Co.; NEW ORLEANS, La., Calmes Engineering Co.; MIAMI, Florida, Auto-Marine Engineers; HOUSTON, Texas, Southern Engine & Pump Co.; NEWTON, Iowa, Winpower Manufacturing Co.; MONTREAL and TORONTO, Consolidated Engines & Machinery Co., Ltd.; WINNIPEG, Mumford, Medland, Ltd.; VANCOUVER, B. C., Hoffars, Ltd.; HALIFAX, Nova Scotia, Stairs, Son & Morrow; ST. JOHNS, Newfoundland, Clayton Construction Co.



duces seal costs. Castings and machined parts are efficiently sealed without using a finishing cut or surface grinding. "Felscal" is especially suited for such units as automatic transmissions, differentials, carburetors, etc., and other similar applications where high service temperatures, extreme cold, fixed gases or solvents may cause sealing problems. Test samples may be obtained from Felt Products Mfg. Co., 1508 Carroll Ave., Chicago 7, Ill.

#### Nordberg Appoints John Kuehn

THE appointment of John Kuehn as Superintendent of Service, Marine Department, is announced by R. W. Bayerlein, Vice-President of the Heavy Machinery Division, Nordberg Manufacturing Company. Mr. Kuehn has been Assistant to Manager of Installation and Service for the past two years. From 1939 to 1946 he was an installation and service engineer for Nordberg. He originally became associated with Nordberg as a machinist apprentice in 1924. Upon becoming a journeyman machinist in 1929, Kuehn joined the U. S. Merchant Marine and continued in this service until he rejoined Nordberg in 1939.



John Kuehn

When Kuehn returned to Nordberg in 1939 he served as installation and guarantee engineer for that company on the *M. S. Sea Witch* of the U. S. Lines. The *Sea Witch*, a Nordberg diesel engine propelled cargo vessel, made its maiden voyage to China, Manila and Australia. When Kuehn returned from this run in 1940 he began his service for Nordberg installing marine diesel engines and doing other general installation and service work.

#### Promotions At Anchor Post

MR. BRANNAN, president of Anchor Post Products, Inc., announced that the resignation of Mr. T. H. Smoot, as vice-president and chief engineer for the corporation, had been accepted and became effective as of April 7, 1949.

John S. Case, formerly vice-president in charge of production, will head all engineering activities of the corporation in addition to production. Mr. Case's new title will be vice-president in charge of engineering and production.

Mr. Don Wooden will assist Mr. Case as assistant chief engineer in charge of the Fluid Heat Domestic Division while Mr. C. E. Wooden, Jr. will also assist Mr. Case as assistant chief engineer in charge of Fluid Heat's specialized heating division. This specialized heating division is the outgrowth of wartime experience and manufacture and the heaters are adaptable to boats, trucks, buses, locomotives and all types of mobile or stationary gasoline or diesel equipment.

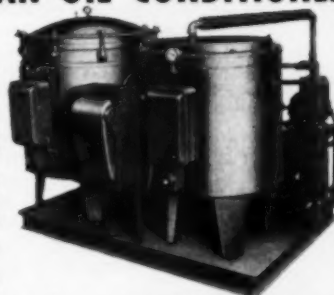
# Here's Engine Protection



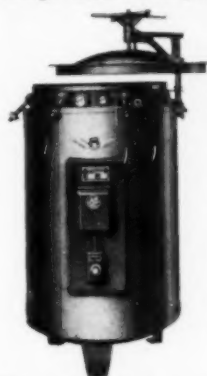
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Complete purification of used LUBE OILS with the HOFFMAN OIL CONDITIONER

Lube oil continually restored to like new specification! Not only protects against engine wear BUT ALSO brings important oil savings! The Hoffman Oil Conditioner removes soluble and insolubles (solids, moisture and fuel dilution) without high maintenance cost of centrifuges. Unit consists of vaporizer and cartridge filter, complete with



oil pump and electric connections. No steam or water... portable and separate operation, if desired. Capacities of 50 to 600 g.p.h.



## HOFFMAN CARTRIDGE FILTERS

For Diesel Fuel and Lube Oils  
Exclusive Cover Lifting—Insulated Head

Compare the advantages! New, convenient cartridge change since cover swings clear on exclusive lifting device—swing bolts simplify removal. Hoffman Cartridge Filters are furnished in wide range of sizes, for 7 x 18 (Navy) or 11 x 18 Cartridges, either repackable or throw-away types. With or without heaters and controls to suit your requirements.

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Write NOW for Bulletins and Details on HOFFMAN Filtration Engineering Service

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For the right answer to your filtering problems, a Hoffman filtration engineer will survey your requirements and furnish recommendations based on detailed analysis of all factors. Ask for this service—There is no obligation.

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CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.



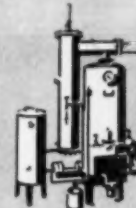
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for fully automatic  
clarification of  
soluble oil coolants



DISC FILTERS  
for continuous flow  
in small space



PRESSURE FILTERS  
for fine filtration



VACUUM STILL  
for solvent recovery

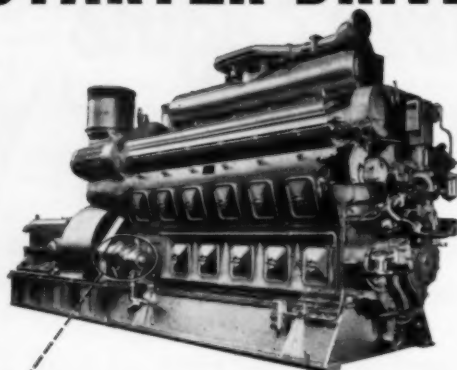
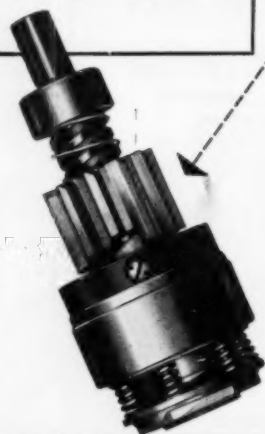


VACUUM FILTERS  
self-cleaning  
continuous operation



# Bendix STARTER DRIVES

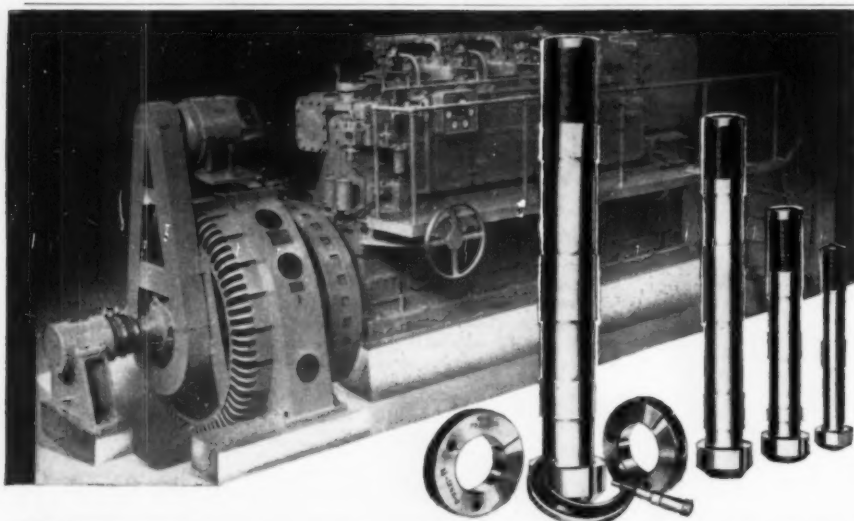
**CHOSEN AGAIN  
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TOUGHEST JOBS...  
AIR-STARTING**



In many of the new diesel installations where electricity is undesirable, air-starting has solved the problem. Here, once again, Bendix® Starter Drives get the call. For the air-cranking motors on these big, rugged diesels naturally use the finest, most reliable starter drives available, and the Bendix Drive has proven these qualities on over 80,000,000 installations. Its powerful, compact design is easily adapted to meet a wide variety of starter requirements. You'll find it's well worth your while to investigate Bendix Starter Drives—whatever your starting problems may be! Our engineers are always ready to work with you.

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## ERIE BOLTING ON DIESEL ENGINES

For over 30 years **ERIE** has manufactured bolts and studs to the specifications of Diesel Engine builders. This specialized experience gained in working with leading Diesel designing engineers assures you of getting the exact materials and the precise tolerance in bolting desired for your Diesel. Send us your specifications for Diesel Connecting Rod Bolts, Cylinder Head Studs, and other special bolting. Write for new price and data book.

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## Washing Machines for Diesel Engines



Magnus diesel engine Aja-Dip Washing Machine.

**THE** Magnus Diesel Engine Aja-Dip Washing Machine is new unit of cleaning equipment in stationary, railroad, marine and automotive diesel repair and overhaul shops for removal of carbon, oil, grease, chips and dirt deposits from engine blocks, heads, cylinder liners, lube-oil strainers, valves and other assemblies.

In the diesel engine washing machine, the parts to be cleaned are mechanically and automatically agitated up and down in the cleaning solution 54 times a minute. At each up and down stroke, the solution is put in turbulent motion, swishing against all surfaces of the work being cleaned.

Practically any type of cleaning solution may be used in this diesel washing machine, including alkaline solutions, emulsifying agents, petroleum solvents or chlorinated solvents. Either heated or cold solutions may be used. If heated solutions are used, heating may be by gas, steam, oil, electricity or kerosene.

## L. F. Munson Appointed To Locomotive Sales



L. F. Munson

**V. H. PETERSON**, manager Railroad Division, Fairbanks, Morse & Co., Chicago, has announced the appointment of **L. F. Munson** as Locomotive Sales Representative with headquarters in St. Paul, Minnesota. Mr. Munson has been associated with the company since 1928 when he started with the firm's St.

Paul Branch as a scale erector. In 1940 he was promoted to the Railroad Department as a Sales Representative. His recent advancement is hailed by his many friends and co-workers as a well deserved promotion.

## Pacific Coast Products Flown To Korea Power Plants

**CHARLES A. WINSLOW**, founder and president of the Winslow Engineering Company of Oakland, Calif., reveals that a 1200-pound shipment of over 40 cases of filter elements were flown to Seoul, Korea late in March to aid in restoration of vital Korean power plants ravaged by Communist terror gangs. News of the shipment had been withheld pending authorization from Washington.





## Announcing a New Piston Ring Material

# "CYCLAN"

Especially developed for severe service in high duty diesel and gas engines. This superior material has the following necessary qualifications of a good piston ring alloy!

- ✓En Value higher than 20,000,000.
- ✓Tensile Strength in excess of 60,000 P. S. I.
- ✓Extreme Resistance to Property Changes under operating conditions.
- ✓High Impact Value for shock resistance.
- ✓High Resistance to Breakage and the ability to undergo considerable distortion prior to fracture without sacrificing resilience.
- ✓A Structure that assures excellent wear qualities.

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# Sealed Power

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CYLINDER SLEEVES



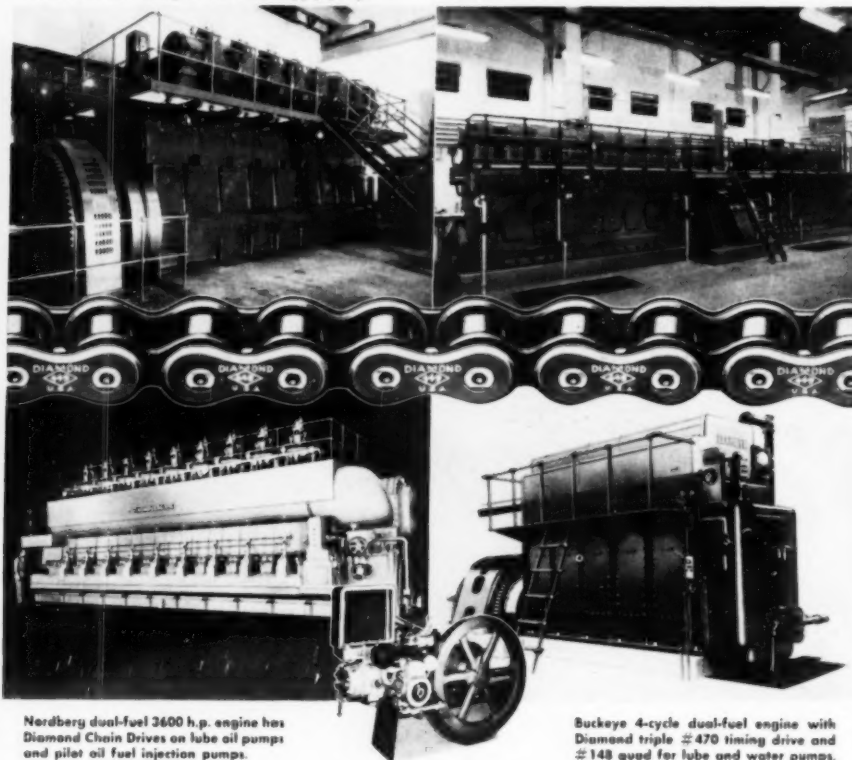
# DUAL FUEL ENGINES

Equipped With

# DIAMOND ROLLER CHAINS

Fulton dual-fuel engine with Diamond #472 triple Chain on both primary and secondary timing drives, #148 triple for the water pump, #148 double on the lube oil pump drive, and #148 single on the fuel supply pump.

Two Cooper-Bessemer 2-cycle 1000 h.p. engines driving 1500 KW generator. Diamond Chain camshaft and fuel pump drives.



Nordberg dual-fuel 2600 h.p. engine has Diamond Chain Drives on lube oil pumps and pilot oil fuel injection pumps.

Lorain dual-fuel engine.—White-Roth Machine Corp.

Suckeye 4-cycle dual-fuel engine with Diamond triple #470 timing drive and #148 quad for lube and water pumps.

● Due to the greatly reduced operating costs, Dual-Fuel engines have been installed in greatly increased numbers during the past few years.

On many well-known 4-cycle dual-fuel engines, Diamond Roller Chains are used for such drives as camshaft primary and secondary timing, fuel oil pumps, lube and water pumps.

On 2-cycle engines as regular and replacement applications, they provide ideal long center drives for the positive

operation of the valves needed to take care of gas intake without waste exhausting with the scavenging air.

A quarter century of service on engines has given ample proof of the long-life efficiency, uniform quality and dependability of Diamond Roller Chains. Discriminating engineers invariably make them first choice.

DIAMOND CHAIN COMPANY, Inc., Dept. 407, 402 Kentucky Avenue, Indianapolis 7, Indiana. *Offices & Distributors in All Principal Cities.*

DIAMOND



ROLLER CHAINS

## High-Speed Diesels

(Continued from page 52)

The most desirable thing to do, under mysterious circumstances of this kind, is to get a "Pattern" of the failure. Collect all the parts possible and study the progress of the failure and attempt to get some parts that have not failed completely. By doing this you can usually trace back to the point where the failure originates.

In this case, a set of bearings was obtained from an engine that had not completely failed. The center bearing design included a circular oil groove, "F" in Figure 1, which was used to distribute the oil around the bearing as well as supply oil to the adjacent connecting rod. The center bearing, out of the above set, gave the clue to what was happening.

From one edge into the oil groove the bearing was perfect but the other side was completely gone. See Figure 2. This condition indicated two things: (1) the failure could not be loading because one-half of the bearing was carrying all the load and was still in good condition, and (2) one side of the bearing was getting a good supply of oil and the other was not, at least that is what it looked like. It was further discovered that the end thrust flange, on the side next to the portion of the bearing that had failed, was badly worn. Upon checking the engine, it was found that the generator attached to the engine had been assembled against the shaft so tightly that excessive end thrust was put in one direction and the crankshaft could not float endwise.

This excessive end thrust, however, was not the only cause. Failures were also occurring in engines that were assembled properly so further investigation was necessary. After again studying the design, a theory was presented that can be better understood by referring to Figure 1. The theory was, that the loose flanges "A" were being pushed out by the oil pressure at "B" against the flange of the shaft, thereby shutting off the outward flow of oil through the passage "C."

There were no oil escape grooves "D" in the face of the thrust flange and when the end play was taken up there was no place for the oil to escape. The theory proved to be the solution. Escape grooves were put in each thrust flange and the trouble disappeared. Upon referring to the original design of the integral flange bearings it was discovered that they had escape grooves.

As an added insurance, integral flange bearings "E" were again used because it was felt that they would provide a better and more continuous channel for some of the bearing heat to escape through the supporting cap and cylinder support. Here was a case of no change in oil supply but in oil escape. Escape grooves must be used in any thrust surface and must be adequate to allow the oil to escape even if there is no end play. This applies also to integral flange designs.





## Robert B. McColl On De-Regulation of Railroads



*Editor's Note:* Robert B. McColl, President, American Locomotive Company, addressing the annual dinner meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers in Chicago, April 27, eloquently stated the case for freedom of the railroads, not only in the United States but throughout the world. Following are excerpts

from Mr. McColl's masterful analysis.

THE 1,300,000 employees and 1,900,000 investors of American railroads are urged to fight for de-regulation of the railroads as the first step toward greater security, better earnings, wider opportunity and better services. Regulation of American railroads to defend the American people against a transportation monopoly came out of 19th century public opinion. I believe it is time to start some 20th century thinking.

Today regulation is actually preventing railroads from achieving their full efficiency in a highly competitive market by making them pay to run while wearing leg irons. If the railroads are not permitted to operate at top efficiency, how can we expect other forms of transportation to be driven by railroad competition to improve their own services and facilities? Regulation of the railroads is often not serving the best interests of the public—it is actually working against them.

I need not tell you what a stimulating effect progressive de-regulation of railroads might have, not only in this country, but throughout the world. For America to turn away from regulation would be a tremendous stimulant to freedom-loving people everywhere. It would be a reaffirmation of the American belief in the individual if we were to start de-socializing our railroads.

Nationalization of the railroads in World War I proved a poor substitute for private enterprise compared with operations in World War II. The difference between government operation and private operation was about 42½ million dollars a day—in favor of private operation—and in favor of the American people.

The objectives of greater security, better earnings and greater opportunity for growth can be achieved only by giving customers of the railroads faster and better service at lower costs—because if we do not first take care of the customer in face of hard competition from trucks, buses, planes, water transportation and pipelines, we can't take care of employees or anyone else.

Our aim must be to give investors a strong, solvent, prosperous dividend-paying railroad industry—one that is attractive to risk capital—because

if we don't attract money, we can't have modernization and low costs; we can't compete successfully with other forms of transportation; we can't get the business; and employees cannot have security, good earnings and opportunity. The basis for security for all must be a dynamic, strong, aggressive, forward-looking industry.

But we cannot count on the general public to rise up and solve our railroad problems for us. . . . The answer lies much closer to home. There are in this country today about 1,300,000 men and women who are employees of America's railroads and who have at least as great a stake in the growth, survival, vigor and security of the railroad industry as any other group in the country. After all, 60 per cent of the costs of operating a railroad are wages. Furthermore, these men and women are organized and vocal.

In addition there are 1,900,000 railroad stockholders and bondholders, and shippers and suppliers who have a big stake in a sound and prosperous railroad industry.

Mr. McColl suggested that railroad employees and investors help achieve these goals:

1. A realistic system of depreciation for railroads. We often have 30 or 40 year depreciation rates in a 10 or 15 year world.

2. An adequate return. Money has got to be earned and paid out to risk capital so that risk capital will flow to the railroads and help them become stronger.

3. A transportation policy fair to all. There is no doubt that our present transportation policy in this country is "loaded" against the railroads. Railroads, he said, get paid less for hauling 94 per cent of the mail in this country than planes do for carrying 6 per cent. The total tax bill of the nation's railroads in 1948 was well over a billion dollars. Proportionately high tax burdens are not shouldered by competitive air, water and other surface carriers. Other carriers are, in the main, operating with municipal, county, state or federal facilities that are paid for by taxes. We find, therefore, that some of the tax money paid by the railroads is devoted to the construction and maintenance of facilities used by competitors.

4. A competitive approach to railroad services. Railroads are forced to perform services and maintain facilities which the public does not want. They are services and facilities which others can provide better and will provide when the railroads are permitted to withdraw them.

Commenting on socialization of England's railroads, Mr. McColl declared that "nationalization is essentially for the desperate and cannot be justified except in desperation. It is a form of receivership. I see no reason, on the basis of experience in England for any American employee to believe that nationalization can have a good and beneficial effect for him.

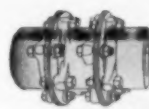
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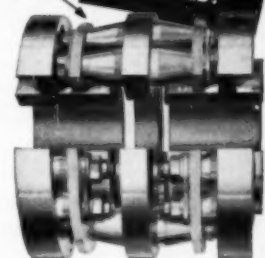


The standard line of Thomas Couplings meets practically all requirements. But if unusual conditions exist we are equipped to engineer and build special couplings.



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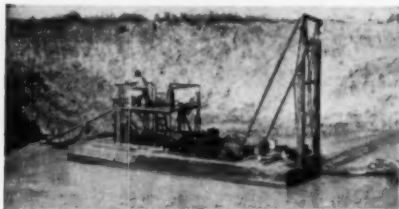
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COUPLING CO.  
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## Home-made Dredge Digs Ship Basin



Home-made dredge working on contract.

A REVOLUTIONARY dredge has been put to use to dig a ship basin adjacent to Colorado Canal between the Gulf of Mexico and Harlingen, Texas.

Although strictly a home-made rig, credit for the clever design belongs to contracts Affoiter and Garnett in Texas.

What can be considered the hull or raft section is of welded steel with standard ship deck plating. It accommodates all of the driving machinery in a specially constructed hold compartment.

Power is supplied by a General Motors diesel engine that is V-belt connected to a 8 in. centrifugal pump. Turning at 560 rpm., the pump throws out 1800 gallons of water, mud and clay mixture per minute. Under normal conditions the dredge will bank 1000 cubic yards of material in a 10 hour working day.

## Diesels Replacing Gas Engines



ONE of the progressive steps taken to decrease haulage costs at the Georgetown, S. C., mill of International Paper Company, Southern Kraft Division, is the replacing of 40 gasoline-powered trucks with a smaller fleet of 10 Cummins Diesel-Powered Corbitts.

This experiment in the use of diesel power in hauling pulpwood in the South is being watched with interest by International Paper, and the industry as a whole. For, unlike the Pacific Northwest and other northern timber areas, the use of diesel power in the southern timberlands is something new.

Formerly a maintenance crew of 52 men was employed to keep the 40 gasoline-powered units in operation. Since the change-over to diesel power, this maintenance crew has been reduced to five men, with an annual savings in salaries alone of approximately \$180,000. The diesel trucks are also saving money on fuel. The 10 diesel units are averaging 7.8 miles to the gallon, as compared to 3.5 miles to the gallon of gasoline averaged by the trucks used previously. Each truck is showing an annual average savings of \$4,250 in fuel costs.

## Booklet On Mack Diesel

JUST off the press is a liberally illustrated catalog featuring Mack Trucks' newly designed 4-cycle, 6-cylinder, 150 h.p. diesel engine, the END 672. Highly readable, easily understood text, accompanied by drawings and photos, presents Mack's new diesel engine in a non-technical manner, with the advantages of automatic timing, controlled combustion and controlled fuel distribution explained simply and lucidly.

A companion piece to the above catalog is another new Mack publication—a booklet entitled "Understanding the Automotive Diesel." As its sub-title, "A Non-technical treatise," indicates, this 67-page booklet is written in layman's language.

Both of the above publications may be secured free of charge by writing to Mack-International Motor Truck Corp., 350 5th Avenue, New York.

## Racine Products at Grand Coulee Dam

IN a recent visit to the West Coast, Fred M. Young, President of Young Radiator Company, stopped off to inspect the world's largest dam project at Grand Coulee. The Young transformer oil coolers were inspected at the Mead Station where Ted Anderson, Electrical Engineer for the Dam Project and Major S. E. Hutton were met.

Mr. Young is quoted as saying that Grand Coulee, one of the world's wonders, is one of the greatest engineering feats he has ever seen.

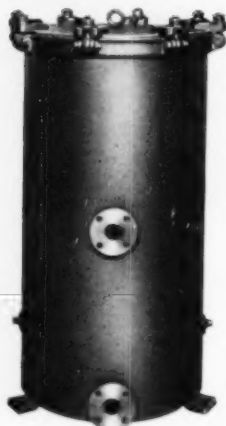
# BETTER OIL FILTERS

Improve Engine Performance

Reduce Maintenance Time and Expense

Eliminate Premature Wear and Replacement Expense

Reduce Oil Costs — Make Oil Serve Longer



653 H.P. Filter Model 19800 using four standard Elements. Other sizes of Filters up to 3266 H.P. using same Elements.

It's plain common sense to help conserve oil, because in doing so, your costs are reduced.

Making lubricating oil serve longer is but one important advantage you gain when MICHIANA Filters are used. More mileage between "oil changes"—less need for engine maintenance, replacements and overhauls.

## For All Engine Capacities

MICHIANA Filters are in wide usage on Diesels of every size in stationary, transportation and marine service.

MICHIANA Filters are the engineers' filters, selected on test and field performance records by leading builders of engines and engine-powered equipment. They are designed and built to meet practical requirements, to do the one job of thorough filtering and cleaning the lubricating oil.

Recommendations based on years of experience are yours for the asking.

MICHIANA PRODUCTS CORPORATION  
Michigan City, Indiana

Write for Illustrated Bulletin 43-D.



163 H.P. Filter Model 17050 in which one standard Element is used.

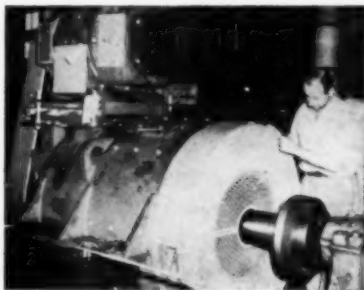


Pair of 17400 Filters on common base casting. Each 50 H.P. capacity—combined, 100 H.P.

**MICHIANA**  
**OIL FILTERS**  
**For Diesel Engines**



### Generator for One of New Ferries for Norfolk, Va. Goes on Test at General Electric



350 kw marine propulsion generator.

A 350-kw. marine propulsion generator goes on test at the Fort Wayne Works of General Electric prior to being installed aboard one of two new ferry boats for Norfolk County (Va.) Ferries. There will be two such generators on each vessel, with each generator receiving power from a 580-hp. Cooper-Bessemer diesel engine. The generators will power G-E 400-hp. marine propulsion motors. The ferries will operate across the Elizabeth River between Norfolk and Portsmouth, where ferry boat operation can be traced back over 300 years. Three steamers, one of which is a side paddle-wheeler, will be replaced by the two diesel-electric vessels.

### Diesel Shop for Southern Railway



SLEEK diesels of the Southern Railway are pictured on tracks alongside the diesel engine repair shop of the railway, recently opened at a formal ceremony at Chattanooga, Tennessee. A total of 83.2 tons of Byers wrought iron pipe went into the construction of the building, which is the biggest diesel shop owned by the road. Services include underground diesel oil lines, return and drip piping, vacuum pump discharge lines, heating piping, all water piping and all vent piping above ground. The structure cost about \$600,000.

### Diesel Builder Adopts New Wonder Iron

THE Cooper-Bessemer Corporation, heavy duty engine builders, today revealed that since the first of this year they have been licensed to produce magnesium-treated cast iron—the first license granted by the International Nickel Company, developers of this revolutionary high strength, ductile iron.

Cooper-Bessemer, themselves well-known for their contributions to metallurgy and foundry technique in connection with Meehanite Metal and other high strength irons, were quick to see the possibilities of the new ductile iron as applied to the design and manufacture of engines and compressors.

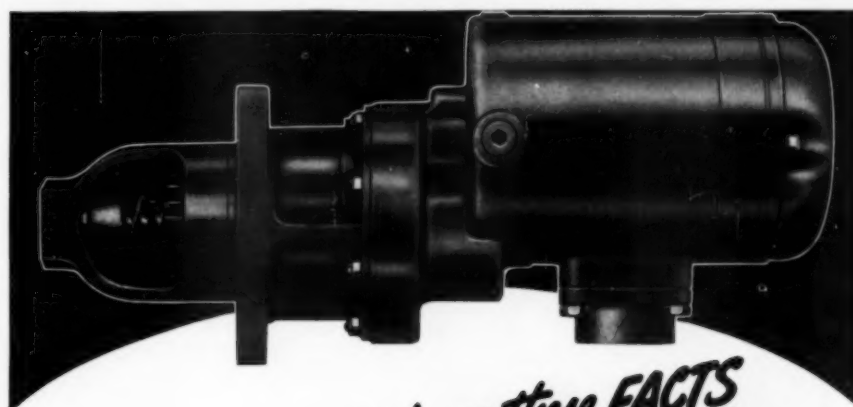
### Engineering Societies Meetings Scheduled

#### S.A.E. National Meetings

Summer Meeting	French Lick Springs Hotel	French Lick, Ind.	June 5-10
West Coast Meeting	Multnomah Hotel	Portland, Ore.	August 15-17
Tractor Meeting	Hotel Schroeder	Milwaukee, Wis.	Sept. 13-15
Aeronautic Meeting and Aircraft Engineering Display	The Biltmore Hotel	Los Angeles	Oct. 5-8
Diesel Engine Meeting	Chase Hotel	St. Louis, Mo.	Nov. 1-2

#### A.S.M.E. National Meetings

Semi-Annual	Univ. of Cal. Extension Bldg.	San Francisco, Cal.	June 27-30
Fall Meeting	Lawrence Hotel	Erie, Pa.	Sept. 28-30
Annual Meeting	Hotel Statler	New York, N. Y.	Nov. 27-Dec. 2



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## LEECE-NEVILLE AIR CRANKING MOTOR

for starting Diesel and Gasoline Engines

● The Leece-Neville Air Cranking Motor for absolutely safe starting of Diesel and gasoline engines brings you outstanding economy, dependability and long-term satisfaction. Advanced engineering has provided six built-in advantages of vital importance to assure superior performance. Write today for bulletin which describes these and gives many other facts it will pay you to have. *The Leece-Neville Company, Cleveland 14, Ohio.*

PERFORMANCE DATA			
Air Pressure p. s. i.	Maximum Dev.	Pinion R. P. M. (Approx.)	Air Consumption c. f. m.
100	10	3000	250
150	15	3600	400
200	20	3600	550

Variable factors control motor application. Under normal cranking conditions one motor may crank engines up to 1000 or more cu. in. displacement. Two motors may be used for larger engines.

#### AIR CAPACITY REQUIREMENTS

A 20 cu. ft. storage tank at not less than 150 p.s.i. should give about 30 seconds cranking. This varies with engine size and temperature. Maximum permissible pressure 250 p.s.i. When temperatures drop to freezing or lower it is desirable to have pressure of 100 p.s.i. or more and an ample supply of air.

#### TYPICAL APPLICATIONS

Typical applications include: mobile road and construction equipment, stationary engines used in hazardous atmospheres (milling, mining, oil refining and related industries), small generating plants and numerous marine applications where compressed air is available at suitable pressure.



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Whatever you are looking for in diesel engines, or accessories, you will find them described and illustrated in the 1948 DIESEL ENGINE CATALOG, Volume 13, edited by Rex W. Wadman. What's more, you will find complete specifications on

### 840 DIFFERENT MODELS

The Products of 53 Engine Manufacturers. Each engine description is complete and accurate—checked and double-checked by the Manufacturer himself. Illustrations include full page engine views, lube and fuel system diagrams, also cooling systems—many traced in color. But that is just the Diesel engine section. The Catalog also includes an accessory section carrying valuable information on the various Fuel Injection Systems, Gear and Chain Drives, Turbochargers, Blowers, all fully described and profusely illustrated.

### FOR DESIGN AND OPERATING ENGINEERS AND BUYERS

There is a Market Place Section—a directory of Diesel engines classified as to ratings and speeds with manufacturers' names and addresses—and a Product Directory including accessories, parts, materials and services—all classified as to products. The Market Place tells you at a glance where to find what you want for your engine or plant.

#### DIESEL ENGINE CATALOG

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3. The Market Place—a classified directory of Diesel Engines and Accessories.
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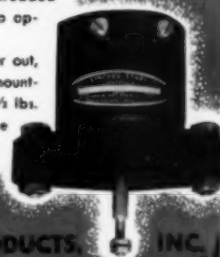
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### Mack Announces Three New Diesel Engines

**H**ERALDED as "the only power plants of their kind designed for a specific line of highway vehicles," three new diesel engines, the END 457, 510 and 672, have been put into production by Mack Trucks. Designed and built by Mack for Mack trucks exclusively, these models are highly improved versions of Mack's war-time diesels, 15,000 of which served the Allied Armies during the recent war. Operating on the four-stroke cycle, these engines are designed to provide controlled combustion and maintain low peak pressures. The exclusive combustion chamber design produces extremely high turbulence which results in thorough and complete combustion to exert a sustained pressure and produce a smooth, powerful piston thrust. At the same time the rate of combustion is controlled, avoiding the hammer-blow effect on pistons commonly associated with diesels having uncontrolled characteristics. Mack describes these engines as smokeless, odorless and free from strain.

The largest producer of diesel-powered trucks in the world, Mack is convinced that diesels, properly applied, can be the answer to the difference between profit and loss, not only for off-highway owners but for long-haul operators as well. Accordingly, these three engines have been designed specifically for the tractor-trailing combination, 40,000 lbs. G.C.W. and up, a range which offers diesel power to long-distance operators to meet any legal requirement of any state.

### New Sales Engineer for Nordberg



Marvin Wall

The appointment of Marvin Wall as Sales Engineer in the Southwestern Territory is announced by R. W. Bayerlein, Vice-president of the Heavy Machinery Division, Nordberg Manufacturing Company, Milwaukee 7, Wis. Mr. Wall's territory includes Texas, New Mexico and Oklahoma. His headquarters is 419 Cotton Exchange Bldg., Dallas, Texas. Mr. Wall succeeds Joseph T. Adams who

was recently appointed District Manager of the Midwestern Territory with headquarters in Kansas City.

Mr. Wall is a native Texan, born and reared near Greenville. He was associated with Cooper-Bessemer Corp. since 1935 when he started work in their Parts Dept. in Greggton, Texas. He was placed in charge of the Parts Dept. of the Dallas District Office in 1940 and in 1945 was transferred to Cooper-Bessemer's Municipal Diesel Engine Dept. as sales engineer in Texas and New Mexico.

### Caterpillar Publishes Two New Booklets

**C**ATERPILLAR has recently published two new booklets profusely illustrated and completed with interesting and useful data. They are entitled—PROFITING THROUGH EARTHMOVING... THE "CATERPILLAR" WAY, and INDUSTRY USES "CATERPILLAR" DIESELS. They may be obtained by writing the Caterpillar Tractor Co., Peoria 8, Illinois, requesting Forms 12108 or 12113 respectively.

### Baldwin Gets Switcher Order

**T**HE Baldwin Locomotive Works has received an order from the Chicago and North Western Railway for five (5) 1500 hp. diesel-electric road switching locomotives. This railway already has in service 27 Baldwin diesel-electric switching and road switching locomotives of various types.

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Left, asbestos insulated, air-jacketed exhaust heat retaining hose. Below, Type SW, Diesel Exhaust. Absorbs vibration, expansion and contraction.

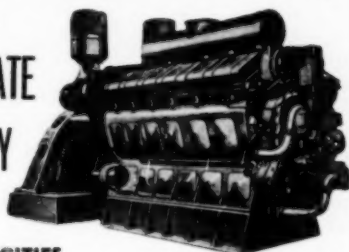


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July 6, 1948

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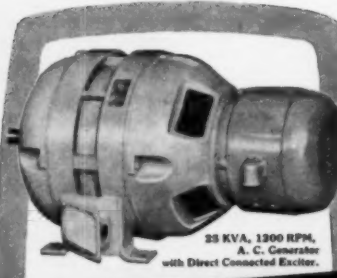
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### W. M. Parrish Retires

W. M. PARRISH, assistant sales manager, manufacturer's sales, industrial power division, International Harvester Company, retired after more than 24 years' service. Long associated with the activities of the automotive industry, Parrish joined the Harvester Company in 1925 to further industrial power equipment sales.



W. M. Parrish

Mr. Parrish also played a major role in establishing company relations with allied equipment manufacturers in addition to perfecting selling relations with dealers handling industrial power equipment.

### Reengined Drag Shows Economy in Gravel Operations



**REPOWERING** of a Model 6 North-west dragline with a Cummins Diesel, permitted Becker County Sand and Gravel Company,

Cheraw, S. C., to use a two-yard drag bucket instead of the original one and one-half yard bucket. At the same time, the new, supercharged 275 hp. Cummins Diesel speeded up work cycles in loading a fleet of 10 Cummins-engined Euclid Bottom Dumps also used in this plant.



### DPS Thermometers

More than thirty styles for diesel application water-oil-exhaust.

Our DPS No. 426 Marine standard shown. All brass heavy nickel plated. Range 80-200°F or 75-225°F.

Price \$2.75 each or  
\$30.00 per dozen.

**Diesel Plant Specialties Co.**  
Stevens Point, Wisconsin

### West Coast Diesel News

By FRED M. BURT

**FROM** the ways of Tacoma Boat Building Co., *Virginia R*, tuna clipper, Capt. Manuel Ribiero of San Pedro; its main engine is a 16 cyl., 2 cycle General Motors diesel; twin GM auxiliaries each turn a 100 kw. Delco generator. The pump system is entirely Fairbanks-Morse.

**PURCHASED** from distributor North West Motor Parts & Mfg. Co., Seattle, by Ozett Timber Co., a pair of Model 148-DKU, 200 hp. @ 2,000 rpm., Waukesha diesels to re-power a Washington logging yard.

**A NEW** 165 hp. Gray diesel has been installed to re-power the *Pershing*, Capt. Sigurd Hendrickson's Seattle halibutter; also a Bendix depth indicator and an Intervox radiophone and depth indicator.

**UNDER** construction at Avondale Marine Ways, Inc., New Orleans, for west coast operation—three latest design (by G. Bruce Newby, Long Beach, Calif.) 121 ft. tuna clippers—the *Sea Magic* for Manuel A. Fernandez, *Excalibur* for Agelino Gon-salves, *Santa Anita* for Wendell Fernandes—each with propulsion power from a Model 567 G.M. 12 cyl. 900 hp. diesel; auxiliaries are a pair of Superior, 8 cyl. 120 diesels direct-connected to 75 kw. Electric Machinery generators.

**BELIEVED** to be the largest vessel yet designed and built as a tuna clipper, built by Western Boatbuilding Co., Tacoma, the 150 ft. x 34 ft. *Mary E. Petrich* has for main power plant a 1,600 hp. opposed piston Fairbanks-Morse diesel; auxiliaries are also newest design F-M diesels.

**DELIVERED** by Evans Engine & Equipment Co., Seattle, two 165 hp. GM diesels for two 46 ft. seiners, New England Fish Co.; to Dan Hjort, Kirkland, Wash., an 83 hp., 3 cyl. G.M. diesels for his new 42 ft. troller.

**BUILT** by Mardesich Bros. for the four Guglielmo brothers of San Pedro, new 45 ft. x 15 ft. fishing boat *St. Aniello* is being powered with a 165 hp. Gray diesel.

**A** 65 ft. purse seiner under construction at the Al Larson boat shop, Terminal Island, will be powered with a 120 hp. 6 cyl. Atlas Imperial.

## SURPLUS DIESELS STILL BIG AID TO \$ WISE BUYERS

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2090 Mill Avenue  
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ACCORDING to a recent San Diego Tribune-Sun financial phase survey, San Diego's tuna clipper fleet has a replacement value above \$50,000,000. Among conditions bankers list as essential to tuna clipper investment are—Construction by shipbuilder familiar with tuna industry and record of successful operations, and dependable engines and operating equipment; and that is where diesels have come in and stayed.

THE 76 ft. *Sterling*, cannery tender of Wards Cove Packing Co., Ketchikan, has had installed a new 260 hp. Hendy diesel, preparatory to the fleet going north for the summer fishing season.

THE Lang Transportation Co., Los Angeles, has purchased a quantity of Cummins Model HRS, super-charged, 225 hp. diesels from Cummins Diesel Service to power trucks of various makes, replacing gasoline engines.

AS of April 1, the Lorimer Diesel Engine Co. became the Lorimer Diesel Engine Division of the Atlas Imperial Engine Co. Ralph Lorimer heads the new division.

TWIN 48 ft. bait-catching and carrying boats built by Tacoma Boat Building Co. for South Seas Marine Products, to operate out of the Fiji Islands, are powered with 165 hp. General Motors Diesels, also having Onan generators.

SIX special Dart trucks for open pit mining of copper and off-highway hauling, for Phelps-Dodge Corp., Morenci, Ariz., have been powered with NHS, 275 hp. super-charged Cummins diesels.

THE 128 ft. converted YP *Alphecca* (to tuna clipper) owned by Machado Medina, while in yards of National Steel and Shipbuilding Corp., San Diego, for overhaul, received a new D-8800 Caterpillar diesel, direct-connected to 50 kw. generating set.

AFTER one Cummins diesel rendered 20 years of dependable service, 110 ft. fish packer *Great Northern No. 1*, Francis Millard Co., Vancouver, B. C., was recently re-powered with a Model LMR-602 Cummins diesel. A former sub-chaser this boat is one of four Cummins-powered boats owned by the company.

TWO large Woolridge Terra Cobra, earth moving units have been powered with Cummins, 200 hp. super-charged diesels, for Gunner Corp., engineering contractors of Pasadena.

WITH main power plant a 600 hp. Washington diesel, and for auxiliaries, three 165 hp. GM diesels driving Bardco generators, Fairbanks-Morse bait pumps, the newest tuna clipper for the Medina family, San Diego is the *May Queen*, built at Tacoma by Puget Sound Boat Building Company; designed by Jim Petrich.

A NEW type air-cooled 5 hp., 1 cyl. Hallet diesel installed in San Diego boat *Fisherette*, owned by Chester H. Gray to operate refrigeration, bait pumps, etc., supplied by Shephard Diesel Marine.

WITH sales and installation by the Jules Engine & Equipment Co., Seattle, a new Gray, Model D6-527 Gray diesel, of 150 hp. was used to power the seiner *Nonsuch* owned by Frank Green Oak Harbor, Wash.

ON MARCH 21, 1949, Nez Perce Tractor & Equipment Co., Lewiston, Idaho, celebrated its 20th year as a "Caterpillar" distributor with a banquet. A. L. Grover, president, welcomed Caterpillar Tractor Co. representatives—J. W. Bridwell, Asst. Chief Eng., B. I. Haglund, Western Div. Sales Manager; Truman Sage, Asst. Sales Manager; W. P. Jones, District Rep.; and Byron Kluesing, Agricultural Representative.

UNDER construction at Terminal Island by August Nordlund, fishing vessel designer and builder, a 45 ft. double-ender for W. D. Hoferer, Long Beach; Cummins-diesel driven, with Monel shaft and Federal-Mogul propeller. A Hallet diesel as auxiliary.



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The controlled rotary turbulence of the Lanova Combustion System gives a Diesel many advantages, such as:

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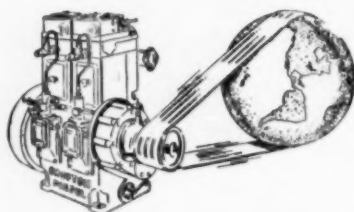
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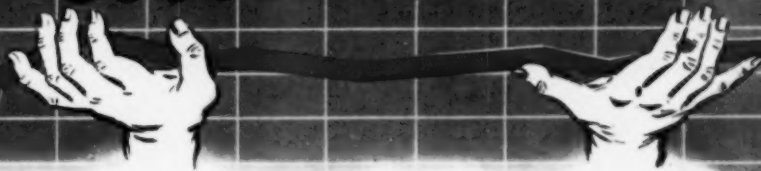
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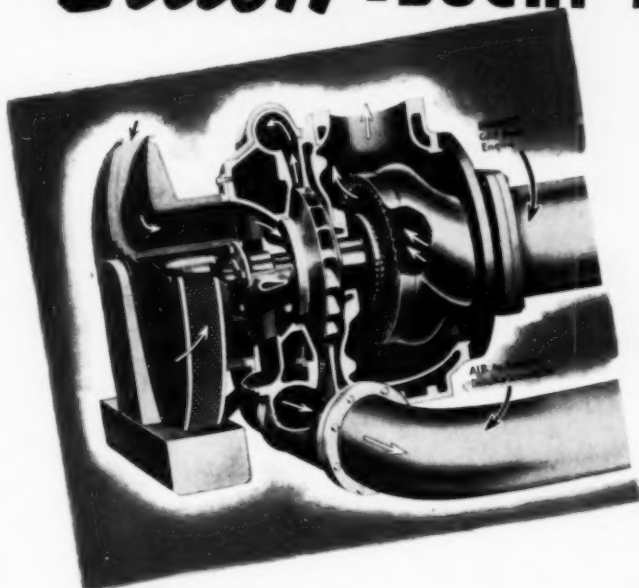
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Two ways to *boost* Diesel KW output



## **Elliott-BUCHI TURBOCHARGERS**

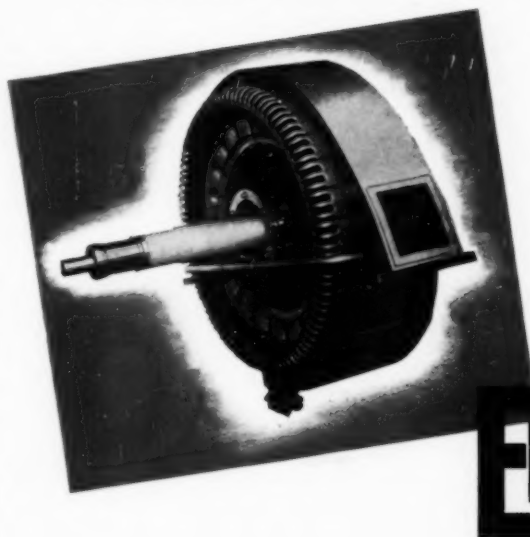


By close approach to the ideal in combustion and scavenging, Elliott-Buchi turbochargers increase Diesel power up to 50 percent—depending upon conditions—and in some cases even more. All this with negligible addition to engine bulk and weight.

Driven entirely by exhaust gas from the engine, with no mechanical driving connection, the turbocharger speed is self-adjusting by the engine load. Direction of rotation remains the same whether engine is driving forward or reversing, a feature of particular importance in marine use.

Elliott-Buchi turbochargers are applied to four-cycle engines of 3 to 16 cylinders, in capacities from 250 to 3850 hp. The bulletin gives the details. Write for a copy.

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The rigidity and rugged strength of all-welded steel in stator frame and rotor spider, is the basis upon which this exceptional generator is built. Most other details of construction are equally striking in their sturdiness and lasting qualities. For instance:

Field poles—built up of steel laminations which are hydraulically riveted together. Large area damper winding joints are silver brazed for permanence.

Field coils for large low-speed machines are edge-wound copper strap, with several coats of baked-on insulating varnish; for higher speed machines, where heat dissipation is less difficult, coils are formed of double cotton covered copper wire wound over heavy rag paper insulating cells on poles.

Stator core is rigidly held by closely spaced stacking studs between the heavy steel end plates. Stator coils are constructed in a long series of operations for positive and lasting insulation.

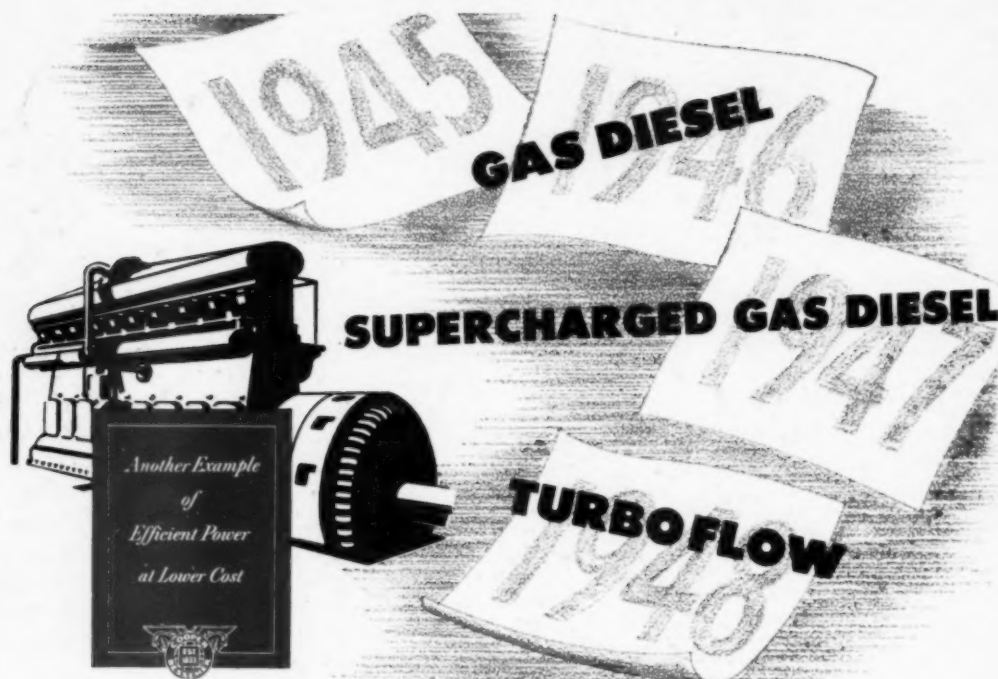
For the full story write for the Elliott Synchronous Generator Bulletin PB-2000.

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**Elliott -BUCHI TURBOCHARGERS** *for maximum power*  
**FABRI-STEEL GENERATORS**





**If you have a stake in stationary power  
you should know about these Cooper-Bessemer developments**

**D**URING the past four years, Cooper-Bessemer has introduced three engine developments of major importance to all users and producers of heavy-duty stationary power . . .

**The Gas-Diesel Engine . . .** Offers the big advantage of using low-cost gas fuel *at full diesel efficiency!* Also, ability to operate on almost any combination of gas and oil or 100% oil fuel makes these engines ideal *wherever gas supply is subject to variation or interruption.* Moreover, a recent refinement gives Cooper-Bessemer gas-diesels record-breaking fuel economy even at *fractional loads.*

**Supercharged Gas-Diesel Engine . . .** Affords still greater fuel economy and up to 50% more power output for a given engine size or displacement. Power needs may be met with fewer or smaller engines, requiring less initial investment and affording huge savings in the cost of installation, housing, maintenance and operation.

**Turboflow Engine . . .** A new principle of operation for gas engines, now applied to Cooper-Bessemers. Compared with ordinary gas engines, there is as much as 20% saving in fuel and up to 15% greater power output.

Detailed information on any of these major developments is available to you on request. If you want to know how you can cut your power costs year in, year out, find out about these and the other new things being done by one of America's oldest engine builders.

*The*  
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